Ref. No.3449

ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER

Black model

BHMD, BHMDN, BHMDC	120V AC, 60Hz
BHMP	230V AC, 50Hz
BHMW	120/220V AC, 50/60Hz
BHMQA	240V AC, 50Hz

SAFETY-RELATED COMPONENT WARNING!!
COMPONENTS INDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.
MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

AMPLIFIER SECTION

Power Output:

Stereo mode
Front L/R channels
80 watts per channel min. RMS. at 8 ohms, both channels driven, from 20 Hz to 20,000 Hz, with no more than 0.08% total harmonic distortion.
Continuous Power output:
2 × 115 watts 4 ohms 1 kHz DIN
2 × 90 watts 8 ohms 1 kHz DIN

Surround mode and Multi source mode
Front L/R and center channels
55 watts per channel min. RMS. at 8 ohms 1,000 Hz, with no more than 0.08% total harmonic distortion.
Rear or Remote channels
20 watts per channel min. RMS. at 8 ohms 1,000 Hz, with no more than 0.8% total harmonic distortion.

Total Harmonic Distortion:	0.08% at rated power (FRONT)
IM Distortion:	0.08% at rated power (FRONT)
Damping Factor:	60 at 8 ohms (FRONT)
Sensitivity and Impedance:	Phono: 2.5 mV/50 kohms
	CD/Tape Play: 150 mV/50 kohms
	Tape Rec: 150 mV/2.2 kohms
Phono Overload:	120 mV RMS. at 1,000 Hz, 0.5% THD.
Frequency Response:	20 to 30,000 Hz, +/–1 dB
RIAA Deviation:	20 to 20,000 Hz, +/–0.8 dB
Tone Control:	BASS: +/–10 dB at 100 Hz
	TREBLE: +/–10 dB at 10,000 Hz
Signal to Noise Ratio:	PHONO: 80 dB (IHF A, 5 mV input)
	CD/TAPE: 100 dB (IHF A)
Muting:	– ∞ dB

VIDEO SECTION

Signal sensitivity and impedance
VDP/VCR input, output: 1 Vp-p, 75 ohms

TUNER SECTION

FM: (other models)

Tuning Range:	87.5 — 108.0 MHz (50 kHz steps)
Usable Sensitivity:	Mono: 11.2 dBf, 1.0 µV, 75 ohms 0.9 µV (S/N 26 dB, 40 kHz Devi.) 75 ohms DIN Stereo: 18.0 dBf, 2.2 µV, 75 ohms 23 µV (S/N 46 dB, 40 kHz Devi.) 75 ohms DIN
50dB Quieting Sensitivity:	Mono: 18.0 dBf, 2.2 µV, 75 ohms Stereo: 37.2 dBf, 20 µV, 75 ohms
Capture Ratio:	1.5 dB
Image Rejection Ratio:	85 dB
IF Rejection Ratio:	90 dB
Signal-to-Noise Ratio:	Mono: 73 dB Stereo: 67 dB
Selectivity:	50 dB DIN (±300 kHz, 40 kHz Devi.)
AM Suppression Ratio:	50 dB
Harmonic Distortion:	Mono: 0.15 % Stereo: 0.25 %
Frequency Response:	30 — 15,000 Hz ±1.5 dB
Stereo Separation:	45 dB at 1 kHz

AM:

Tuning Range:	European models 522 — 1611 kHz (9 kHz steps) USA and Canadian models 530 — 1710 kHz (10 kHz steps) Saudi Arabia and worldwide models 531 — 1602 kHz (9 kHz steps)
Usable Sensitivity:	30 µV
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	40 dB
Signal-to-Noise Ratio:	40 dB
Total Harmonic Distortion:	0.7 %

TUNER SECTION

FM: (120V model)

Tuning Range:	87.5 — 108.0 MHz (50 kHz steps)
Usable Sensitivity:	Mono: 11.2 dBf, 2.0 µV
	Stereo: 17.2 dBf, 4.0 µV
50dB Quieting Sensitivity:	Mono: 17.2 dBf, 4.0 µV
	Stereo: 37.2 dBf, 40 µV
Capture Ratio:	1.5 dB
Image Rejection Ratio:	40 dB
IF Rejection Ratio:	90 dB
Signal-to-Noise Ratio:	Mono: 73 dB
	Stereo: 67 dB
Alternate Channel Attenuation:	55 dB
AM Suppression Ratio:	50 dB
Total Harmonic Distortion:	Mono: 0.15%
	Stereo: 0.25%
Frequency Response:	30 — 15,000 Hz +/–1.5 dB
Stereo Separation:	45 dB at 1 kHz/30 dB at 100 — 10,000 Hz
Muting Level:	17.2 dBf, 4.0 µV

GENERAL

Dimensions (W × H × D):	455 × 170 × 388 mm 17-15/16" × 6-11/16" × 15-5/16"
Weight:	13.5 kg (29.8 lbs)

SERVICE PROCEDURES

1. Replacing the fuses

For continued protection against fire hazard, replace only with same type and same rating fuse.

Circuit no.	Part no.	Description
F901	252166Y	⚠6.3A-UL/T-237,Primary fuse 〈D/W〉
F902	252076	⚠3.15A-SE-EAK,Primary fuse 〈P/W/Q〉
F903	252075	⚠2.5A-SE-EAK,AC outlet fuse 〈P〉
F911,F912	252166Y	⚠6.3A-UL/T237,Secondary fuse 〈D〉
	252079	⚠6.3A-SE-EAK,Secondary fuse 〈P/W/Q〉

NOTE: 〈D〉 :Only 120V model
〈P〉 :Only 230V model
〈W〉 :Only Worldwide model
〈P〉 :Only 240V model

2. Change of FM/AM band step.

With the exception of the Worldwide model, a BAND STEP selector switch is not provided.

(AM)

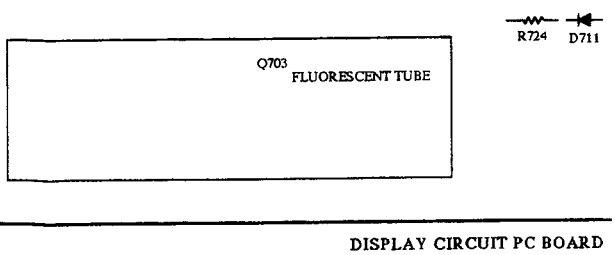
BAND STEP	R724	D711
10kHz→9kHz	Addition	Addition
9kHz→10kHz	Eliminated	Eliminated

In R724 Carbon resistor 1 kΩ
(Part No.417341024) is used.
In D711 Diode 1SS270A
(Part No.223205) is used.

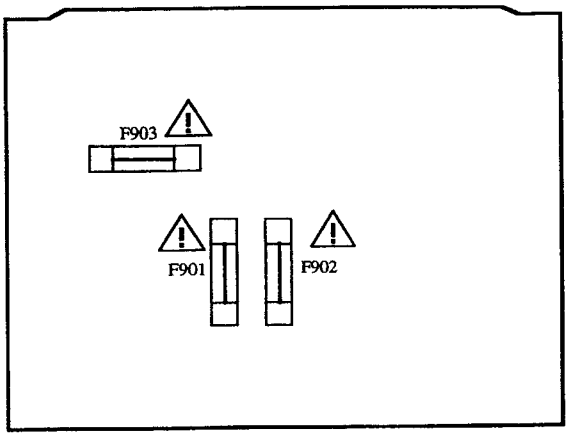
－Worldwide model－

Worldwide models are equipped with a step band selector switch. This switch is located on the back panel. This switch is set to 9kHz (AM) at the factory, but may have to be reset to 10kHz depending on the area where the unit is used.

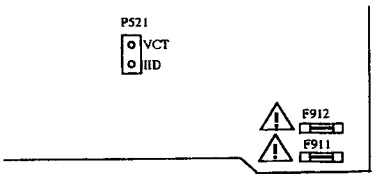
	AM step
Europe:	9kHz
U.S.A:	10kHz



DISPLAY CIRCUIT PC BOARD



POWER SUPPLY CIRCUIT PC BOARD



MAIN CIRCUIT PC BOARD

3. Memory preservation

This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory the power switch must be turned on and off a few times each month to keep the back-up system operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

4. Safety-check out

(Only U.S.A. model)

After correcting the original service problem perform the following safety check before releasing the set to the customer.

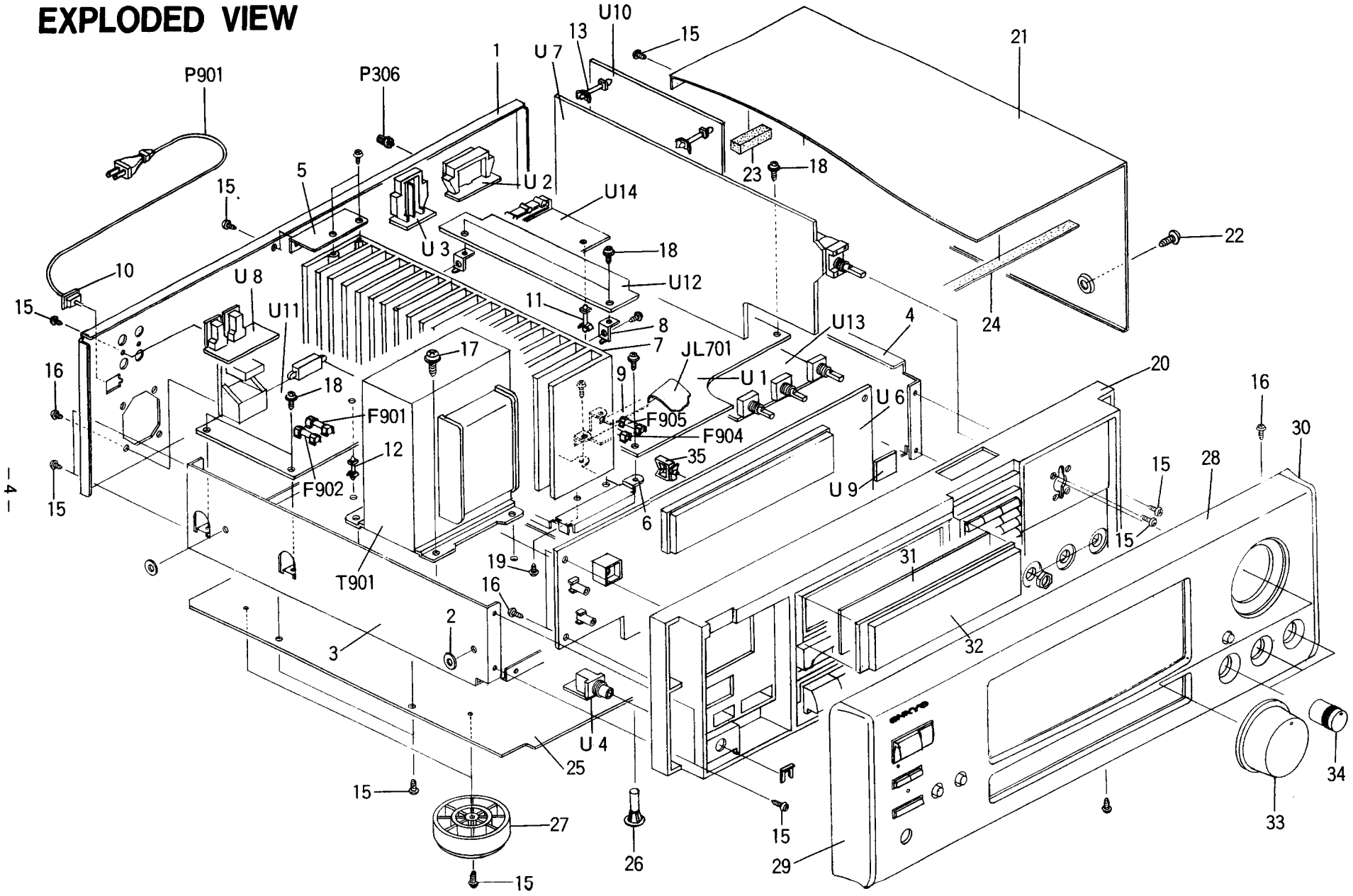
Connect the insulating-resistance tester between the plug of power supply cord and terminal GND on the back panel.
Specifications: 3.3 Mohm ±10% at 500V.

5. Change of voltage

Worldwide models are equipped with a voltage selector to conform with local power supplies. This switch is located on the back panel. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on.

This switch is set to 220V at the factory. Voltage is changed by sliding the groove in the switch with the screw-driver to the right or left. Confirm that the switch has been moved all the way to the right or left before turning the power switch on.

EXPLODED VIEW



PARTS LIST

REF.NO.	PART NO.	DESCRIPTION
1	27121706AY	Rear panel <D>
	27121707AY	Rear panel <P>
	27121708AY	Rear panel <W>
	27121709AY	Rear panel <Q>
	27121710AY	Rear panel <PX>
2	27270212	Spacer <P/W/Q>
3	27130717AY	Bracket,power transformer
4	27115255Y	Side bracket
5	27141607Y	Retainer H
6	27130718Y	Bracket H
7	27160323Y	Radiator
8	27141530A	Retainer HS-2
9	27141532	Retainer PD-1
10	27300750	⚠ Cord,bushing
11	27190369	KGLS-22S,Holder
12	27190480	KGLS-8S,Holder
13	27190062	KGLS-12S,Holder
14	801433	3SMS8W.SW+14B(BC),Sems screw
15	834430088	3TTS+8B(BC),Self-tapping screw
16	833430080	3TTP+8P(BC),Self-tapping screw
17	830440089	4TTC+8C(BC),Self-tapping screw
18	831130088	3TTW+8B,Self-tapping screw
19	834430108	3TTS+10B(BC),Self-tapping screw
20	27110754CY	Front bracket ass'y
21	28184535Y	Top cover
22	838440089	4TTB+8C(BC),Self-tapping screw
23	28141132	6 t× 60 ×10,Cushion
24	28140546Y	0.5 t× 390 ×10,Cushion
25	27170300AY	Bottom panel
26	27190926	KGLS-18RF,Holder
27	27175251AY	Leg
28	1A425701K	Front panel ass'y
29	28125251AY	End cap L
30	28125252AY	End cap R
31	28191661	Clear plate
32	28133299Y	Back plate
33	28324775	Knob VOLUME
34	28324376A	Knob TONE
35	260220	WS-3NS,Clamp
F901	252166Y	⚠ 6.3A-UL/T-237,Primary fuse <D/W>
F902	252076	⚠ 3.15A-SE-EAK,Primary fuse <P/W/Q>
F903	252075	⚠ 2.5A-SE-EAK,Primary fuse <P>
F911,F912	252166Y	⚠ 6.3A-UL/T-237,Secondary fuse <D>
	252079	⚠ 6.3A-SE-EAK,Secondary fuse <P/W/Q>
JL701	2041322010 or	NCFC1-322010 or
	2047322012Y	NCFC7-322012,Flexible flat cable
P306	25060044	Terminal,ground

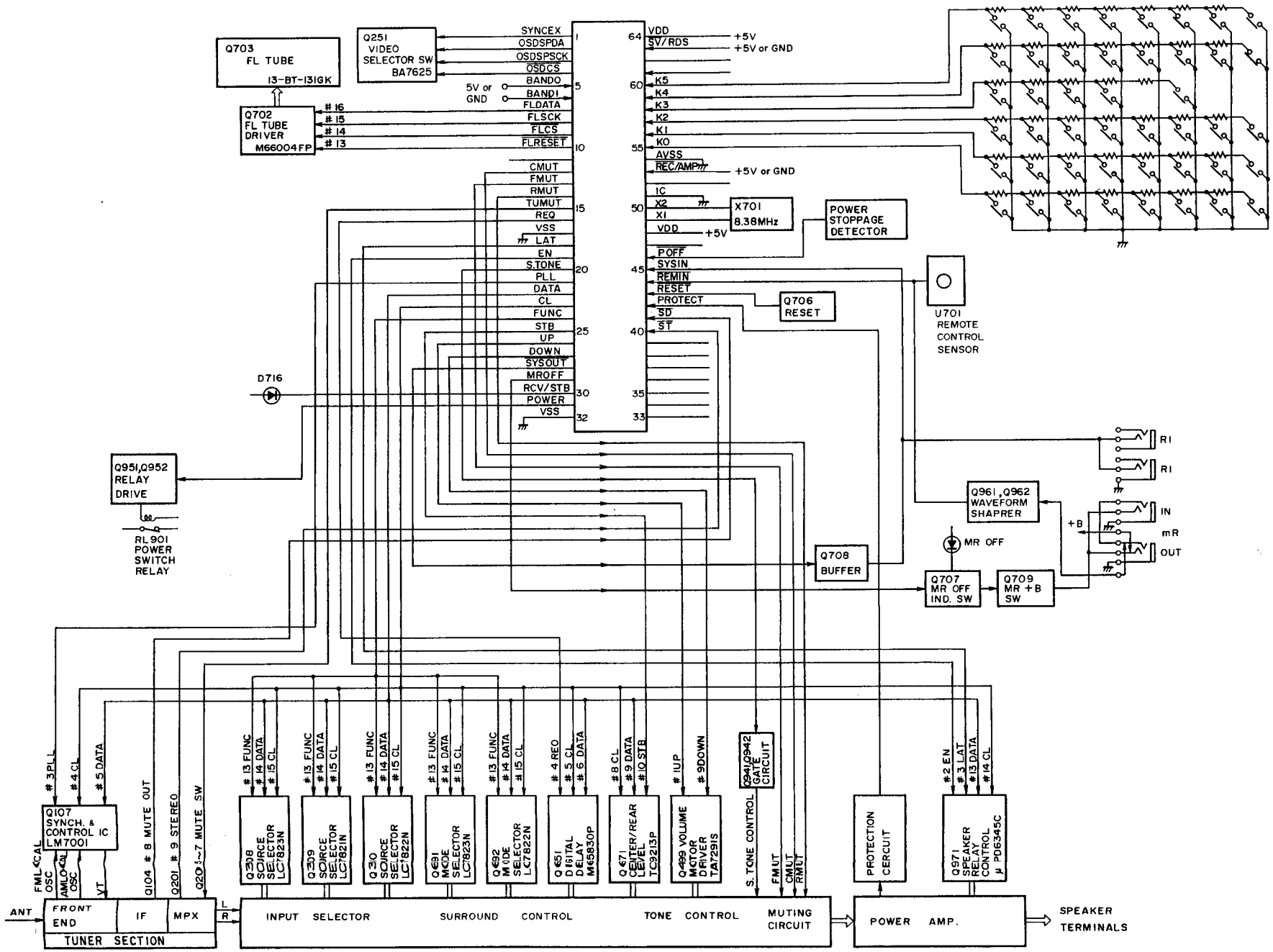
REF.NO.	PART NO.	DESCRIPTION
P901	253163Y or	⚠ AS-UC-6 #18,
	253174Y	⚠ Power supply cord <D/PX>
	253164Y or	⚠ AS-CEE,
	253175Y	⚠ Power supply cord <P>
	253170	⚠ AS-SAA,Power supply cord <Q>
	253172 or	⚠ AS-CEE-2,
	253092-1A	⚠ Power supply cord <W>
P902,P903	25050904	⚠ NSCT-2P697,AC outlet <Q>
Q505,Q506	2201653,	* 2SC3856-O,
	2201654,	* 2SC3856-Y,
	2201655,	* 2SC3856-P,
	2202272 or	* 2SC3907-R or
	2202273	* 2SC3907-O,Power transistors
Q507,Q508	2201663,	* 2SA1492-O,
	2201664,	* 2SA1492-Y,
	2201665,	* 2SA1492-P,
	2202262 or	* 2SA1516-R or
	2202263	* 2SA1516-O,Power transistors
Q543	2202253,	* 2SC4467-O,
	2202254,	* 2SC4467-Y,
	2202256,	* 2SC4467-P,
	2202502 or	* 2SC3182N-R or
	2202503	* 2SC3182N-O,Power transistor
Q544	2202243,	* 2SA1694-O,
	2202244,	* 2SA1694-Y,
	2202246,	* 2SA1694-P,
	2202492 or	* 2SA1264N-R or
	2202493	* 2SA1264N-O,Power transistor
Q575,Q576	2202063,	* 2SC4511-O,
	2202064 or	* 2SC4511-Y or
	2202066	* 2SC4511-P,Power transistors
Q577,Q578	2202053,	* 2SA1725-O,
	2202054 or	* 2SA1725-Y or
	2202056	* 2SA1725-P,Power transistors
T901	2300891Y	⚠ NPT-1168D,Power transformer <D>
	2300892Y	⚠ NPT-1168P,Power transformer <P>
	2300893Y	⚠ NPT-1168DG,Power transformer <W>
	2300894Y	⚠ NPT-1168Q,Power transformer <Q>
U1	1A425592-1	NAAR-4692-1,Main circuit pc board ass'y <D>
	1A425592-1A	NAAR-4692-1A,Main circuit pc board ass'y <P/W/Q>
U2	1A425593-1	NAETC-4693-1,Center speaker terminal pc board ass'y <D>
	1A425593-1A	NAETC-4693-1A,Center speaker terminal pc board ass'y <P/W/Q>

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

REF.NO.	PART NO.	DESCRIPTION
U3	1A425594-1	NAETC-4694-1,Speaker terminal pc board ass'y <D>
	1A425594-1A	NAETC-4694-1A,Speaker terminal pc board ass'y <P/W/Q>
U4	1A425595-1	NAETC-4695-1,Headphone terminal pc board ass'y
U6	1A425597-1	NADIS-4697-1,Display circuit pc board ass'y <D>
	1A425597-1A	NADIS-4697-1A,Display circuit pc board ass'y <P/Q>
	1A425597-1B	NADIS-4697-1B,Display circuit pc board ass'y <W>
U7	1A425598-1	NAAF-4698-1,Surround circuit pc board ass'y
U8	1A425599-1	NAETC-4699-1,RI/MR terminal pc board ass'y <D/P/Q>
	1A425599-1B	NAETC-4699-1B,RI/MR terminal pc board ass'y <W>
U9	1A425500-1	NASW-4700-1,STC switch pc board ass'y
U10	1A425501-1	NARF-4701-1,Tuner circuit pc board ass'y <D>
	1A425501-1A	NARF-4701-1A,Tuner circuit pc board ass'y <P/Q>
	1A425501-1B	NARF-4701-1B,Tuner circuit pc board ass'y <W>
U11	1A425502-1	NAPS-4702-1,Power supply circuit pc board ass'y <D>
	1A425502-1A	NAPS-4702-1A,Power supply circuit pc board ass'y <P>
	1A425502-1B	NAPS-4702-1B,Power supply circuit pc board ass'y <W>
	1A425502-1C	NAPS-4702-1C,Power supply circuit pc board ass'y <Q>
	1A425502-1D	NAPS-4702-1D,Power supply circuit pc board ass'y <PX>
U12	1A425503-1	NAAF-4703-1,Rear amplifier pc board ass'y <D>
	1A425503-1A	NAAF-4703-1A,Rear amplifier pc board ass'y <P/W/Q>
U13	1A425504-1	NAAF-4704-1,Tone control circuit pc board ass'y
U14	1A425505-1	NAETC-4705-1,Video circuit pc board ass'y

NOTE: <D>:120V model only
<P>:230V model only
<W>:Worldwide model only
<Q>:240V model only
<PX>:PX model only

MICROPROCESSOR DESCRIPTIONS



Terminal Description

Pin No.	Function	I/O	Description
1	SYNCEX	O	Video signal control A output terminal.
2	OSDSPDA	O	Video signal control D output terminal.
3	OSDSPSCK	O	Video signal control B output terminal.
4	$\overline{\text{OSDCS}}$	O	Video signal control C output terminal.
5	BAND0	I	Initializing input terminal for FM/AM band region.
6	BAND1	I	
7	FLSDATA	O	Connect to the terminal SDATA of Fluorescent tube driver M66004FP. (Q702)
8	FLSCK	O	Connect to the terminal SCK of Fluorescent tube driver M66004FP.
9	$\overline{\text{FLCS}}$	O	Connect to the terminal $\overline{\text{CS}}$ of Fluorescent tube driver M66004FP.
10	$\overline{\text{FLRST}}$	O	Connect to the terminal $\overline{\text{RESET}}$ of Fluorescent tube driver M66004FP.
11	PLAYER	O	Player control output terminal. Not used.
12	CENTMUT	O	Muting output terminal for the center amplifier.
13	FRONTMUT	O	Muting output terminal for the front amplifier.
14	REARMUT	O	Muting output terminal for the rear amplifier.
15	TU MUT	O	Muting output terminal for the tuner.
16	REQ	O	Connect to the terminal REQ of Digital delay M65830P.(Q651)
17	VSS	-	Ground terminal
18	$\overline{\text{LAT}}$	O	Connect to the terminal $\overline{\text{LAT}}$ of Output extended IC μ PD6345C.(Q971)
19	EN	O	Connect to the terminal EN of Output extended IC μ PD6345C.
20	S.TONE	O	Selective tone control output terminal.
21	PLL	O	Connect to the terminal CE of PLL IC.(Q107)
22	DATA	O	Connect to the terminal DI of Analog switches LC7821N,LC7822N, and LC7823N, the terminal DATA of PLL IC LM7001, the terminal DATA of Electro volume TC9213P, the terminal DATA of Digital delay M65830P, and the terminal SIN of Output extended IC μ PD6345C.
23	CL	O	Connect to the terminal CL of Analog switches LC7821N,LC7822N, and LC7823N, the terminal CL of PLL IC LM7001, the terminal CK of Electro volume TC9213P, the terminal SCK of Digital delay M65830P, and the terminal SCK of Output extended IC μ PD6345C.
24	FUNC	O	Connect to the terminal CE of Analog switches LC7821N,LC7822N, and LC7823N. (Q309,Q310,Q692,Q308 and Q691)
25	STB	O	Connect to the terminal STB of Electro volume TC9213P. (Q671)
26	VOLUP	O	Volume UP/DOWN control output. (Q499)
27	VOLDOWN	O	
28	$\overline{\text{SYSOUT}}$	O	System code output terminal.

Operation	#27	#26
Stop	H	H
Volume up	L	H
Volume down	H	L

VIDEO SIGNAL CONTROL OUTPUT

Input Selector

#1	#3	SOURCE
L	L	VIDEO-3
H	L	VIDEO-2
L	H	
H	H	VIDEO-1

Recording Selector

#4	#2	SOURCE
L	L	VIDEO-3
H	L	VIDEO-2
L	H	
H	H	VIDEO-1
Same as #1	Same as #3	Other position
Same as #1	Same as #3	Multi mode

Pin No.	Function	I/O	Description
29	$\overline{MR}$	O	MULTI ROOM indicator control output.
30	$\overline{STBY/RECV}$	O	STAND-BY/RECEIVED indicator control output.
31	POWER	O	Power switch relay control output.
32	VSS		Ground terminal.
33	———	O	Not used.
34	———	O	Not used.
35	———	O	Not used.
36	———	O	Not used.
37	———	O	Not used.
38	———	O	Not used.
39	———	I	Not used.
40	$\overline{STEREO}$	I	Stereo detection input terminal.
41	$\overline{SD}$	I	Broadcast detection input terminal.
42	PROTECT	I	Protection circuit operation detection input terminal.
43	$\overline{RESET}$	I	System reset input terminal.
44	$\overline{REMIN}$	I	Remote control signal input terminal.
45	SYSIN	I	System code input terminal.
46	$\overline{POFF}$	I	Detection input terminal for the stoppage of electric current.
47	———	I	Not used.
48	VDD		Power supply terminal.(+5V)
49	X2		Ceramic resonator connection terminal for the main system clock .
50	X1		Connect the ceramic resonator 8.38 MHz.
51	IC		Connect to the ground terminal.
52	XT2		Not used.
53	XT1		
54	AVSS		Ground terminal of A/D converter.
55	K0	I	Operation key connection terminals.
56	K1	I	
57	K2	I	
58	K3	I	
59	K4	I	
60	K5	I	
61	———		Not used.
62	MODE	I	Initializing input terminal for Receiver or Amplifier.
63	AVDD		Analogue power supply terminal of A/D converter. (+5V)
64	AVREF		Reference voltage input terminal of A/D converter.

Initializing Input

#7,#6

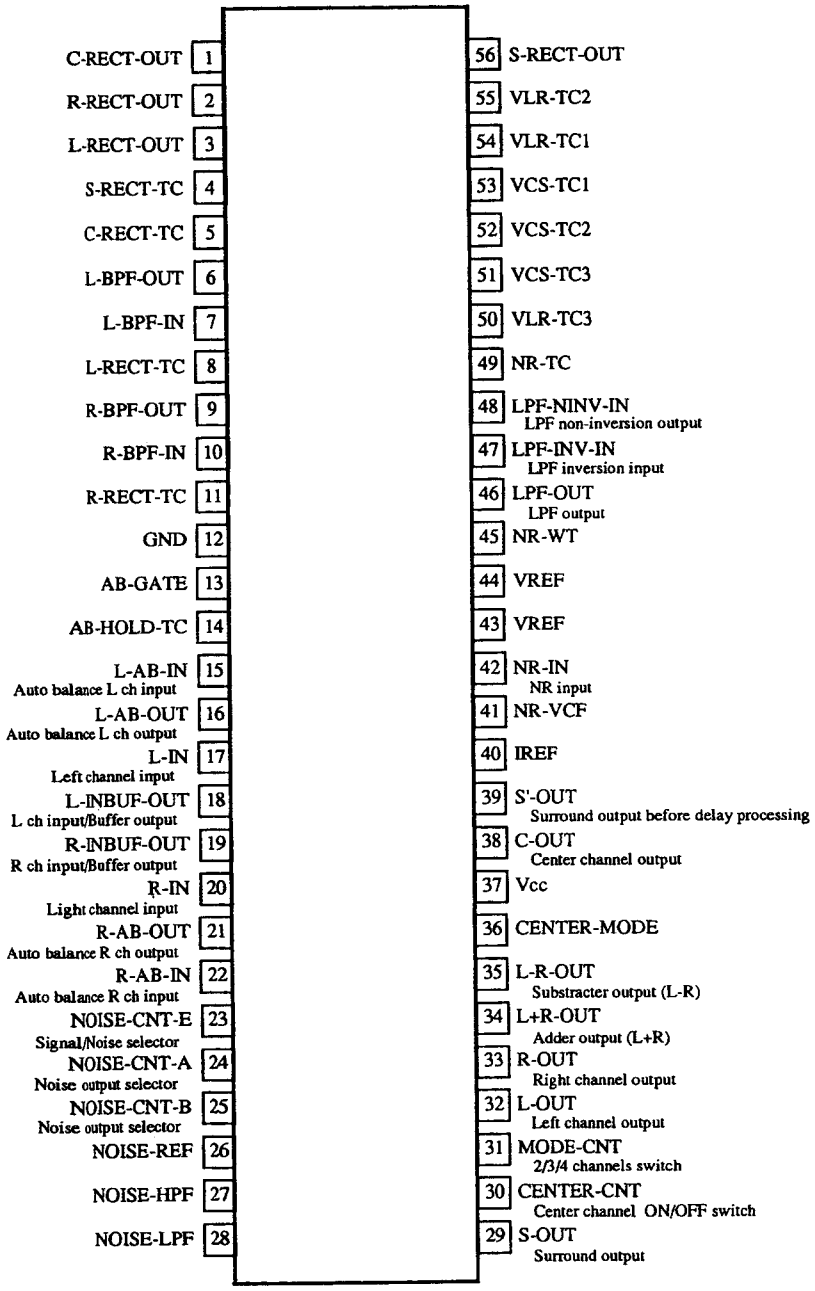
BAND1	BAND0	Regin	Band	Frequency Range	Channel Space
0	0	U.S.A.	FM	87.50~108.00MHz	50kHz
			AM	530~1710kHz	10kHz
0	1	Europe	FM	87.50~108.00MHz	50kHz
			AM	530~1710kHz	9kHz
1	0	Worldwide	FM	87.50~108.00MHz	50kHz
			AM	530~1710kHz	9kHz
1	1	Japan	FM	87.50~108.00MHz	100kHz
			AM	530~1710kHz	9kHz

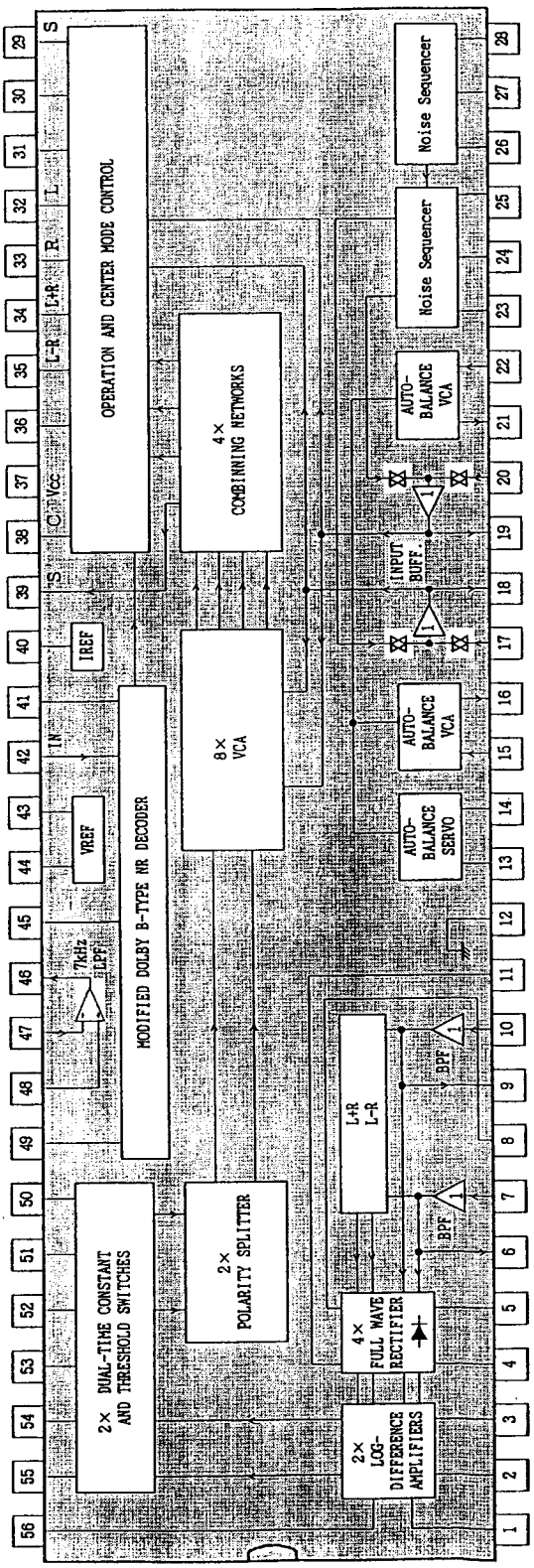
#62

MODE	OPERATION
0	Receiver
1	Amplifier

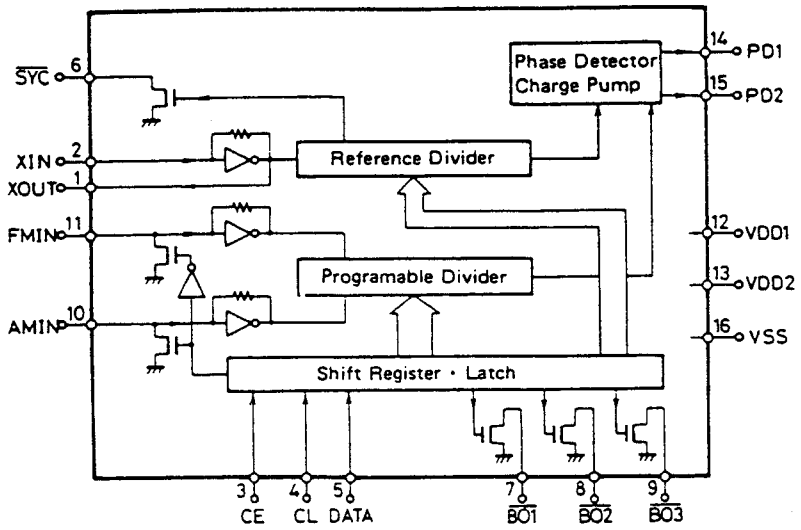
IC BLOCK DIAGRAMS AND DESCRIPTIONS

Q602
NJM2177L / M69032P (Dolby Pro Logic)



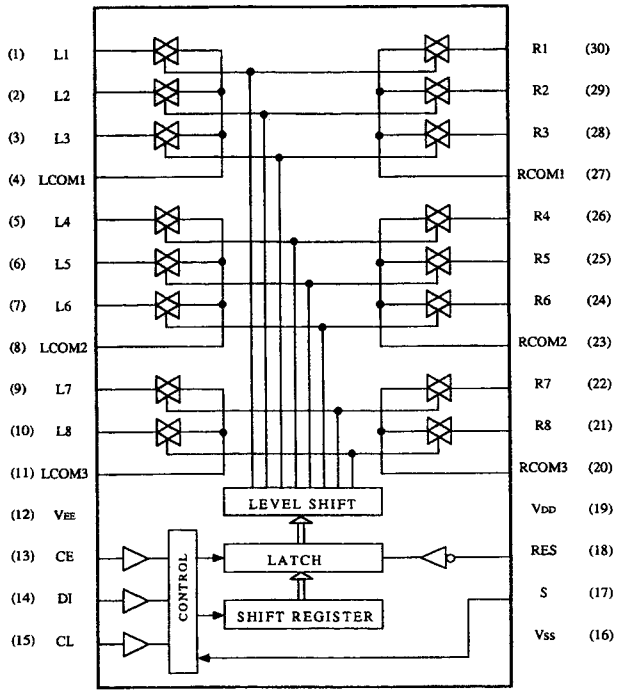


Q107
LM7001 (PLL Synthesizer and Controller)



Pin No.	Terminal	Description
1	XOUT	Connect to the 7.2 MHz crystal oscillator.
2	XIN	
3	CE	Chip enable terminal. Connect to the PLL terminal of microprocessor.
4	CL	Serial clock input terminal. Connect to the CLOCK terminal of microprocessor.
5	DATA	Serial data input terminal. Connect to the DATA terminal of microprocessor.
6	$\overline{SYN}$	Not used.
7	$\overline{AUTO/MONO}$	AUTO/MONO selection output terminal. "L" when AUTO.
8	$\overline{FM}$	FM band control output terminal. "L" when FM.
9	$\overline{AM}$	AM band control output terminal. "L" when AM.
10	AMIN	AM local oscillator input terminal.
11	FMIN	FM local oscillator terminal.
12	V_{DD} 1	Power supply terminal for back-up.
13	V_{DD} 2	Power supply terminal.
14	PD1	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided local oscillator frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies matched. The output is applied to the variable capacitor diode in the local oscillator through the low pass filters.
15	PD2	
16	Vss	Ground terminal.

Q310, Q692
LC7822N (Analogue switch)



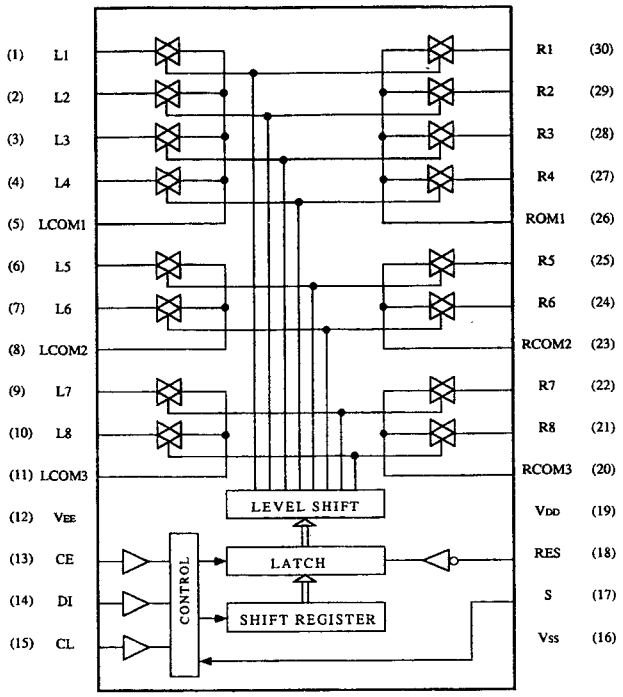
Q310

Pin No.	Terminal	Description	Pin No.	Terminal	Description
1	$\overline{\text{VIDEO-3' REC}}$		16	VEE	Ground terminal
2	VIDEO-2'	Input/output terminals of multi source of left channel.	17	S	Selector terminal
3	$\overline{\text{VIDEO-2' REC}}$	Control the analogue switch at the serial data.	18	$\overline{\text{RES}}$	Reset terminal. When power is turned on, the condition of the analogue switch is not determined, but when this terminal is "L", all analogue switches are off.
4	LCOM1				
5	$\overline{\text{VIDEO-2 MON}}$	Input/output terminals of audio signal			
6	VIDEO-2	of left channel.			
7	$\overline{\text{VIDEO-3 MON}}$	Control the analogue switch at the serial data.			
8	LCOM2		19	VDD	Power supply terminal (+15V)
9	VIDEO-3'	Input/output terminals of VIDEO-3 signal	20	RCOM3	Input/output terminals of VIDEO-3 signal
10	VIDEO-3	of left channel.	21	VIDEO-3	of right channel.
11	LCOM3	Control the analogue switch at the serial data.	22	VIDEO-3'	Control the analogue switch at the serial data.
12	Vss	Negative power supply terminal (-15V)	23	RCOM2	Input/output terminals of audio signal
			24	$\overline{\text{VIDEO-3 MON}}$	of right channel.
13	CE	Chip enable terminal. Connect to the terminal FUNC of the microprocessor.	25	VIDEO-2	Control the analogue switch at the serial data.
			26	$\overline{\text{VIDEO-2 MON}}$	
14	DI	Serial data input terminal. Connect to the terminal DATA of the microprocessor.	27	RCOM1	Input/output terminals of multi source
			28	$\overline{\text{VIDEO-2' REC}}$	of right channel.
15	CL	Serial clock input terminal. Connect to the terminal CL of the microprocessor.	29	VIDEO-2'	Control the analogue switch at the serial data.
			30	$\overline{\text{VIDEO-3' REC}}$	

Q692

Pin No.	Terminal	Description	Pin No.	Terminal	Description
1	SURROUND		16	VEE	Ground terminal
2	NC		17	S	Selector terminal
3	MULTI		18	$\overline{\text{RES}}$	Reset terminal. When power is turned on, the condition of the analogue switch is not determined, but when this terminal is "L", all analogue switches are off.
4	LCOM1				
5	MULTI	Input/output terminals of audio source of left channel.			
6	HALL	Control the analogue switch at the serial data.			
7	DOLBY				
8	LCOM2		19	VDD	Power supply terminal (+15V)
9	$\overline{\text{DOLBY}}$		20	RCOM3	
10	DOLBY		21	DOLBY	
11	LCOM3		22	$\overline{\text{DOLBY}}$	
12	Vss	Negative power supply terminal (-15V)	23	RCOM2	
			24	DOLBY	Input/output terminals of audio signal
13	CE	Chip enable terminal. Connect to the terminal FUNC of the microprocessor.	25	HALL	of right channel.
			26	NULTI	Control the analogue switch at the serial data.
14	DI	Serial data input terminal. Connect to the terminal DATA of the microprocessor.	27	RCOM1	
			28	MULTI	
15	CL	Serial clock input terminal. Connect to the terminal CL of the microprocessor.	29	NC	
			30	SURROUND	

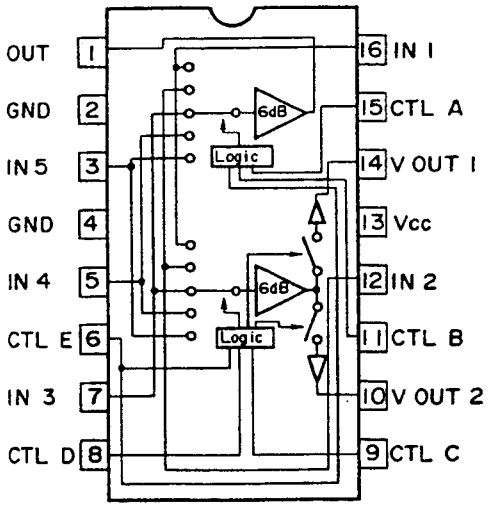
Q309
LC7821N (Analogue switch)



Q309

Pin No.	Terminal	Description	Pin No.	Terminal	Description
1	VIDEO-1'		16	VEE	Ground terminal
2	TUNER'	Input/output terminals of multi source of left channel.	17	S	Selector terminal
3	TAPE-1'	Control the analogue switch at the serial data.	18	$\overline{RES}$	Reset terminal. When power is turned on, the condition of the analogue switch is not determined, but when this terminal is "L", all analogue switches are off.
4	$\overline{TAPE\text{-}1'\ REC}$				
5	LCOM1				
6	$\overline{TAPE\text{-}1\ MON}$	Input/output terminals of TAPE-1 signal			
7	TAPE-1	of left channel.			
8	LCOM2	Control the analogue switch at the serial data.	19	VDD	Power supply terminal (+15V)
9	TUNER	Input/output terminals of audio signal	20	RCOM3	Input/output terminals of audio signal of right channel.
10	VIDEO-1	of left channel.	21	VIDEO-1	Control the analogue switch at the serial data.
11	LCOM3	Control the analogue switch at the serial data.	22	TUNER	
12	Vss	Negative power supply terminal (-15V)	23	RCOM2	Input/output terminals of TAPE-1 signal
			24	TAPE-1	of right channel.
13	CE	Chip enable terminal. Connect to the terminal FUNC of the microprocessor.	25	$\overline{TAPE\text{-}1\ MON}$	Control the analogue switch at the serial data.
			26	RCOM1	
14	DI	Serial data input terminal. Connect to the terminal DATA of the microprocessor.	27	$\overline{TAPE\text{-}1'\ REC}$	Input/output terminals of multi source
			28	TAPE-1'	of right channel.
15	CL	Serial clock input terminal. Connect to the terminal CL of the microprocessor.	29	TUNER'	Control the analogue switch at the serial data.
			30	VIDEO-1'	

Q251
BA7625 (Video Selector Switch)



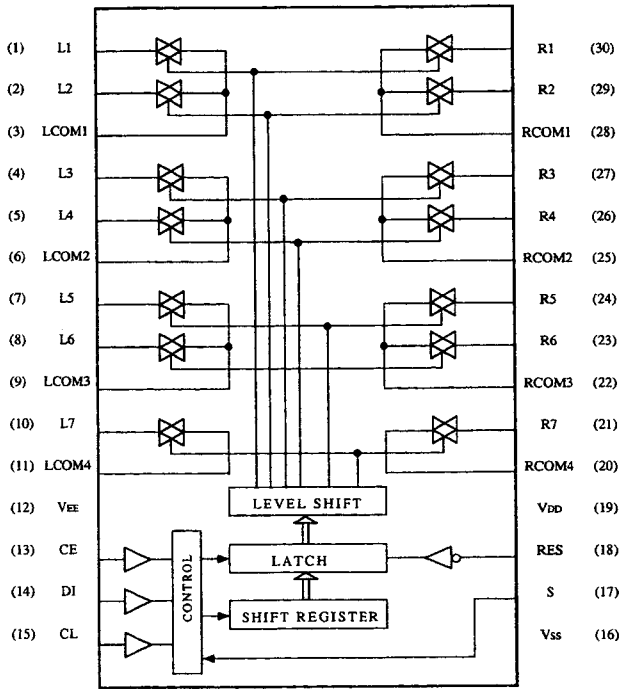
#15	#11	#6	#1
A	B	E	MONITOR OUT
L	L	X	IN1
H	L	X	IN2
L	H	X	IN3
H	H	L	IN4
H	H	H	IN5

X:Don't care

#9	#8	#6	#14
C	D	E	VOUT 1
L	L	X	
H	L	X	IN2
L	H	X	IN3
H	H	L	IN4
H	H	H	IN5

#15	#11	#6	#10
A	B	E	VOUT 2
L	L	X	IN1
H	L	X	
L	H	X	IN3
H	H	L	IN4
H	H	H	IN5

Q308, Q691
LC7823N (Analogue switch)



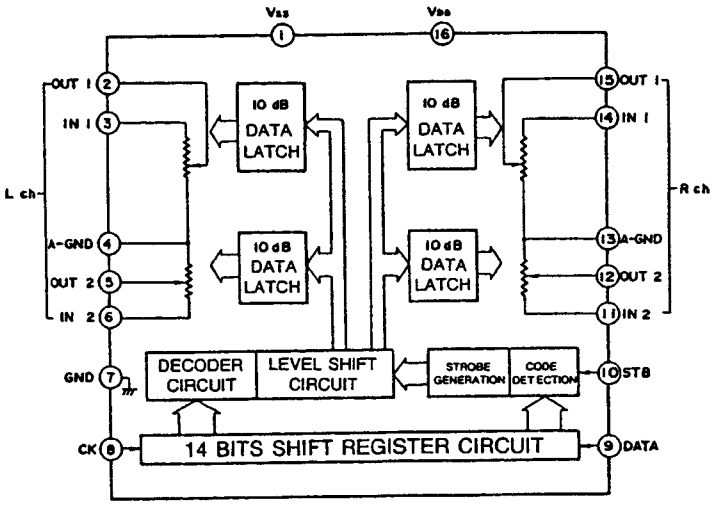
Q308

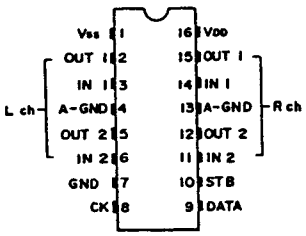
Pin No.	Terminal	Description
1	PHONO'	Input/output terminals of multi source of left channel.
2	CD'	Control the analogue switch at the serial data.
3	LCOM1	
4	CD	Input/output terminals of audio signal of left channel.
5	PHONO	Control the analogue switch at the serial data.
6	LCOM2	
7	SOURCE	
8	TAPE-2	
9	LCOM3	
10	TAPE-2'	Input/output terminals of multi source of left channel.
11	LCOM4	Control the analogue switch at the serial data.
12	Vss	Negative power supply terminal (-15V)
13	CE	Chip enable terminal. Connect to the terminal FUNC of the microprocessor.
14	DI	Serial data input terminal. Connect to the terminal DATA of the microprocessor.
15	CL	Serial clock input terminal. Connect to the terminal CL of the microprocessor.
16	VEE	Ground terminal
17	S	Selector terminal
18	$\overline{RES}$	Reset terminal. When power is turned on, the condition of the analogue switch is not determined, but when this terminal is "L", all analogue switches are off.
19	VDD	Power supply terminal (+15V)
20	RCOM4	Input/output terminals of multi source of right channel.
21	TAPE-2'	Control the analogue switch at the serial data.
22	RCOM3	Input/output terminals of audio signal of right channel. Control the analogue switch at the serial data.
23	TAPE-2	
24	SOURCE	
25	RCOM2	
26	PHONO	
27	CD	
28	RCOM1	Input/output terminals of multi source of right channel. Control the analogue switch at the serial data.
29	CD'	
30	PHONO'	

Q691

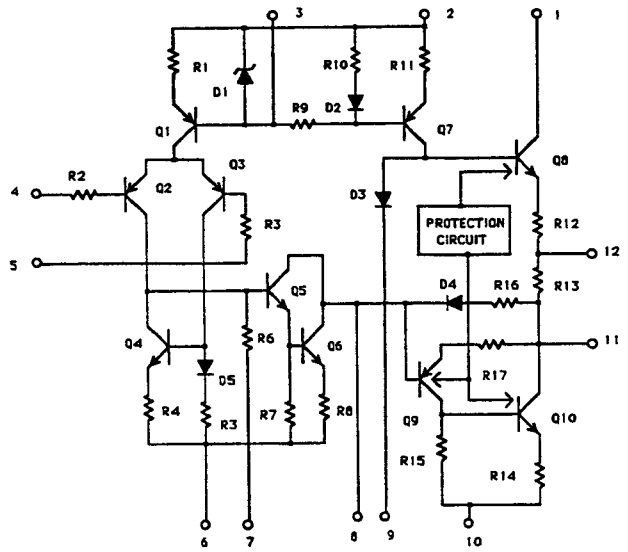
Pin No.	Terminal	Description
1	DOLBY	Input/output terminals of digital delay signal when surround mode. Control the analogue switch at the serial data.
2	HALL	
3	LCOM1	
4	NORMAL	Mode select terminal when Dolby Pro Logic. Control the analogue switch at the serial data.
5	WIDE	
6	LCOM2	
7	TEST B	
8	TEST A	
9	LCOM3	
10	TEST	
11	LCOM4	
12	Vss	Negative power supply terminal (-15V)
13	CE	Chip enable terminal. Connect to the terminal FUNC of the microprocessor.
14	DI	Serial data input terminal. Connect to the terminal DATA of the microprocessor.
15	CL	Serial clock input terminal. Connect to the terminal CL of the microprocessor.
16	VEE	Ground terminal
17	S	Selector terminal
18	$\overline{RES}$	Reset terminal. When power is turned on, the condition of the analogue switch is not determined, but when this terminal is "L", all analogue switches are off.
19	VDD	Power supply terminal (+15V)
20	NC	Not used.
21	NC	
22	NC	
23	NC	
24	NC	
25	NC	
26	NC	
27	NC	
28	NC	
29	NC	
30	NC	

Q451
TC9213P (Eiectro Volume)

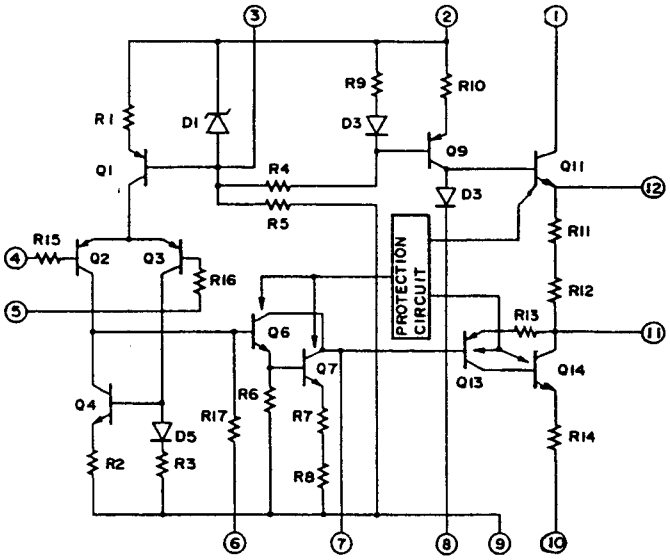




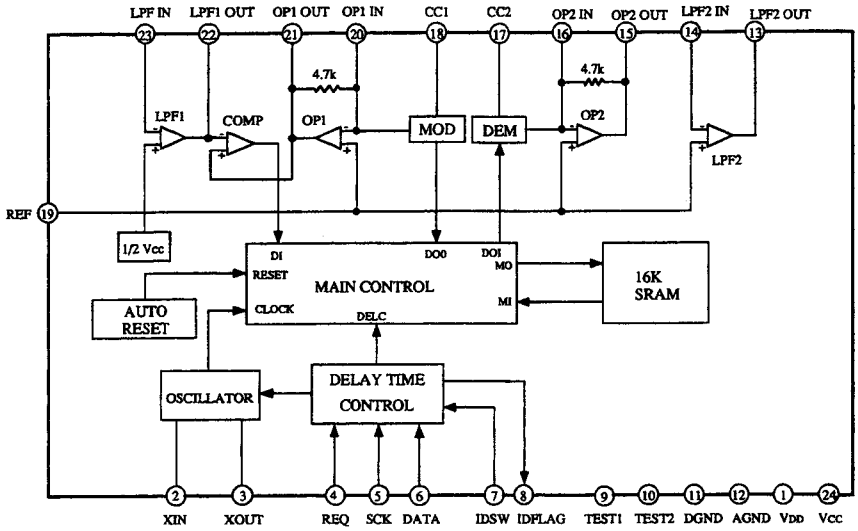
Q501, Q502, Q541
μPC1298V (Power Amplifier Driver)



Q571, Q572
μPC1225H

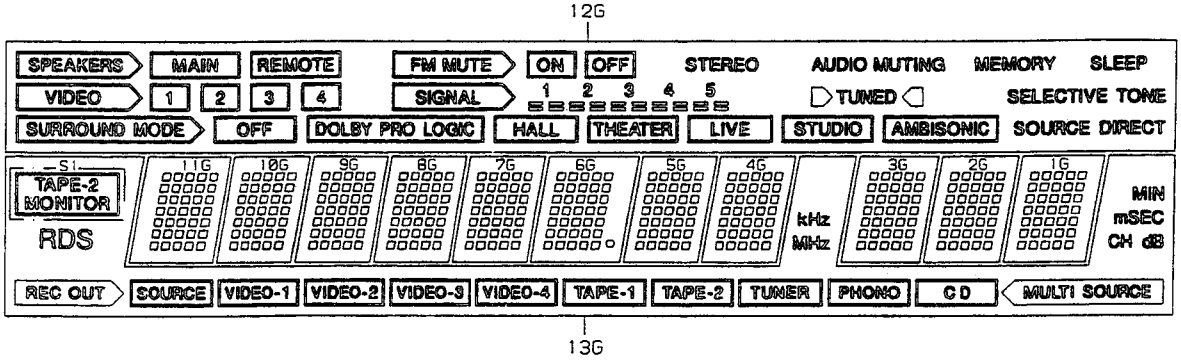


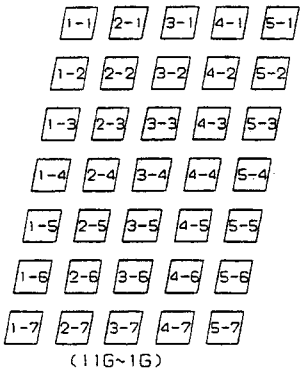
Q661
M65830P (Digitai Delay)



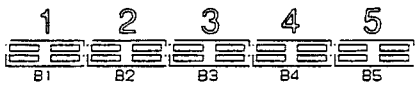
Pin No.	Mark	Function	I/O	Description
1	VDD	Digital power supply	-	
2	XIN	Resonator input	I	Connect the 2MHz ceramic resonator
3	XOUT	Resonator output	O	
4	REQ	Request	I	Data request input
5	SCK	Shift lock	I	Serial data shift clock input
6	DATA	Data	I	Serial data input
7	IDSW	ID switch	I	External input of 4th bit of ID code
8	IDFLAG	ID flag	O	Data input confirmation pulse and serial data output
9	TEST1	Test 1	-	Normal mode when low level
10	TEST2	Test 2	-	Normal mode when low level
11	D GND	Digital ground	-	
12	A GND	Analog ground	-	
13	LPF2 OUT	LPF filter 2 output	O	
14	LPF2 IN	LPF filter 2 input	I	
15	OP2 OUT	Operation amp. 2 output	O	
16	OP2 IN	Operation amp. 2 input	I	
17	CC2	Current control 2	-	Demodulation ADM control
18	CC1	Current control 1	-	Modulation ADM control
19	REF	Reference	-	Analog reference voltage=1/2VCC
20	OP1 IN	Operation amp. 1 input	I	
21	OP1 OUT	Operation amp. 1 output	O	
22	LPF1 OUT	LPF filter 1 output	O	
23	LPF1 IN	LPF filter 1 input	I	
24	VCC	Analog power supply	-	

Q703
13-BT-131GK (Fluorescent Indicator Tube)





(11G~1G)

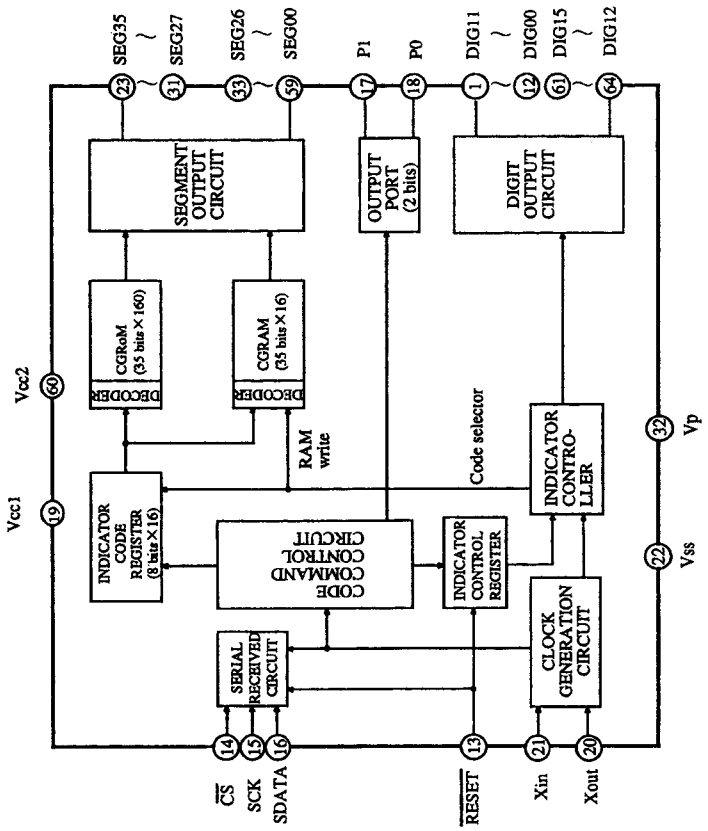


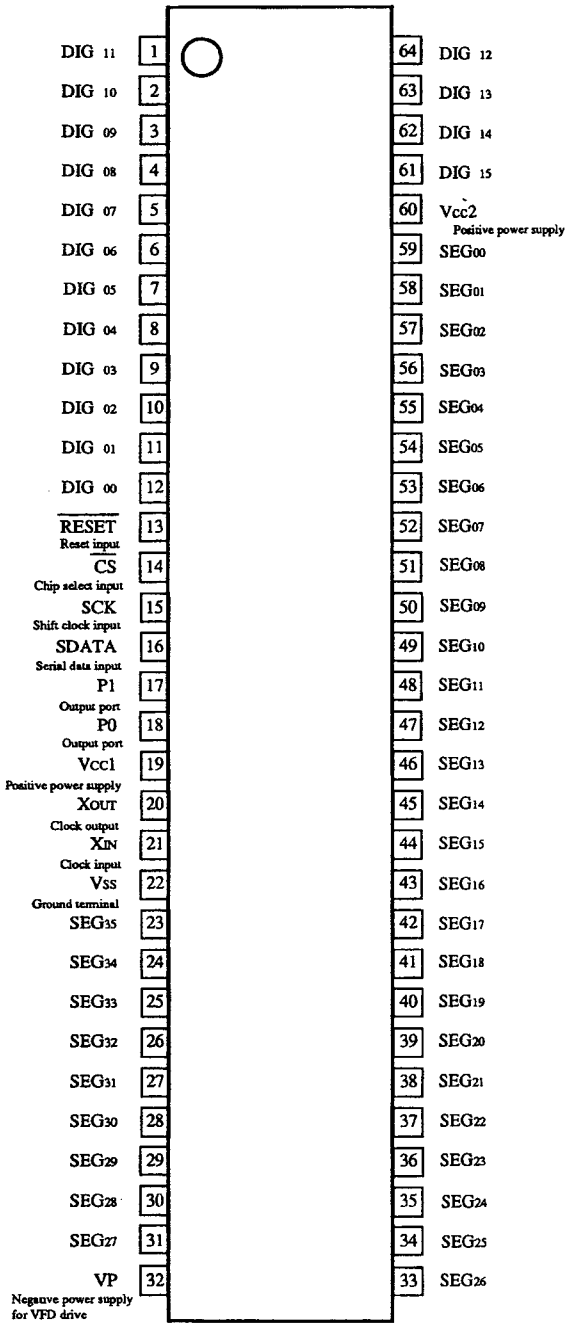
(12G)

	13G	12G	11G~7G	6G	5G~1G
P1	MIN	SLEEP	1-1	1-1	1-1
P2	mSEC	MEMORY	2-1	2-1	2-1
P3	dB	AUDIO MUTING	3-1	3-1	3-1
P4	CH	SELECTIVE TONE	4-1	4-1	4-1
P5	MULTI SOURCE	SOURCE DIRECT	5-1	5-1	5-1
P6	REC OUT	TUNED	1-2	1-2	1-2
P7	SOURCE	▷ ◁	2-2	2-2	2-2
P8	(SOURCE)	STEREO	3-2	3-2	3-2
P9	VIDEO-1	OFF (Center)	4-2	4-2	4-2
P10	(VIDEO-1)	ON	5-2	5-2	5-2
P11	VIDEO-2	FM MUTE	1-3	1-3	1-3
P12	(VIDEO-2)	AMBISONIC	2-3	2-3	2-3
P13	VIDEO-3	STUDIO	3-3	3-3	3-3
P14	(VIDEO-3)	LIVE	4-3	4-3	4-3
P15	VIDEO-4	THEATER	5-3	5-3	5-3
P16	(VIDEO-4)	HALL	1-4	1-4	1-4
P17	TAPE-1	DOLBY PRO LOGIC	2-4	2-4	2-4
P18	(TAPE-1)	OFF (LEFT)	3-4	3-4	3-4
P19	TAPE-2	SURROUND MODE	4-4	4-4	4-4
P20	(TAPE-2)	1 2 3 4 5	5-4	5-4	5-4
P21	TUNER	B5	1-5	1-5	1-5
P22	(TUNER)	B4	2-5	2-5	2-5
P23	PHONO	B3	3-5	3-5	3-5
P24	(PHONO)	B2	4-5	4-5	4-5
P25	CD	B1	5-5	5-5	5-5
P26	(CD)	SIGNAL	1-6	1-6	1-6
P27	kHz	REMOTE	2-6	2-6	2-6
P28	MHz	MAIN	3-6	3-6	3-6
P29	S1	SPEAKERS	4-6	4-6	4-6
P30	RDS	4	5-6	5-6	5-6
P31		3	1-7	1-7	1-7
P32		2	2-7	2-7	2-7
P33		1	3-7	3-7	3-7
P34		VIDEO	4-7	4-7	4-7
P35			5-7	5-7	5-7
P36				○	

PIN NO.	64	63	62	61	60	59	58	57
CONNECTION	F2	F2	NP	NP	P36	P35	P34	P33
PIN NO.	56	55	54	53	52	51	50	49
CONNECTION	P32	P31	P30	P29	P28	P27	P26	P25
PIN NO.	48	47	46	45	44	43	42	41
CONNECTION	P24	P23	P22	P21	P20	P19	P18	P17
PIN NO.	40	39	38	37	36	35	34	33
CONNECTION	P16	P15	P14	P13	P12	P11	P10	P9
PIN NO.	32	31	30	29	28	27	26	25
CONNECTION	P8	P7	P6	P5	P4	P3	P2	P1
PIN NO.	24	23	22	21	20	19	18	17
CONNECTION	NC	NC	NC	NC	NC	NC	NC	13G
PIN NO.	16	15	14	13	12	11	10	9
CONNECTION	12G	11G	10G	9G	8G	7G	6G	5G
PIN NO.	8	7	6	5	4	3	2	1
CONNECTION	4G	3G	2G	1G	NP	NP	F1	F1

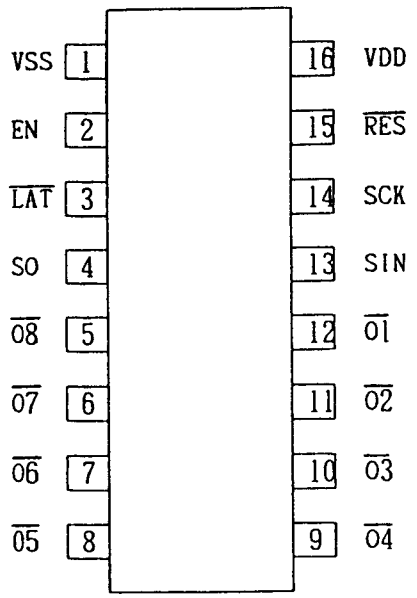
Q702
μM6604FP (FL tube Driver)



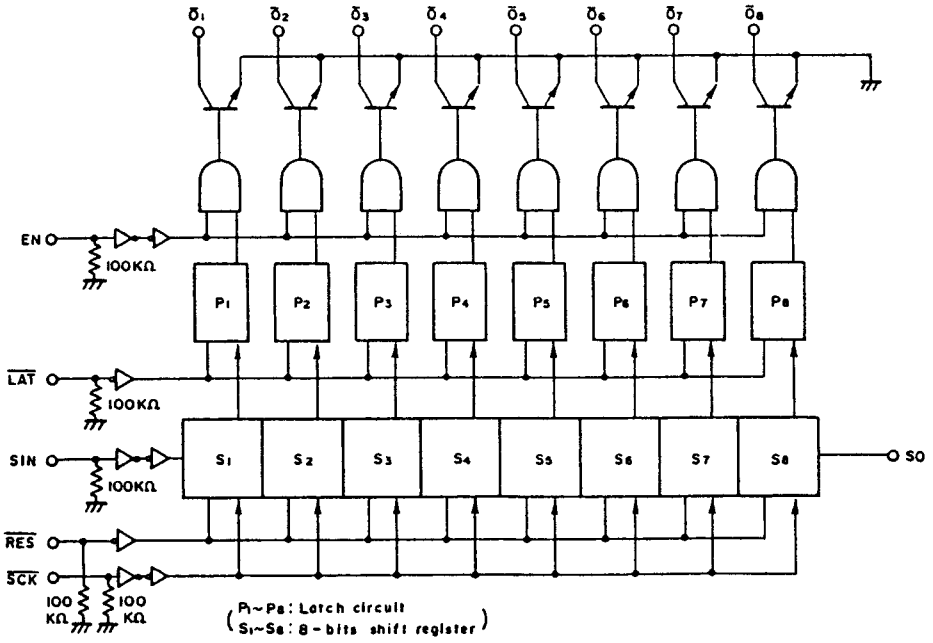


DIG00~DIG15:Digit output
SEG00~SEG35:Segment output

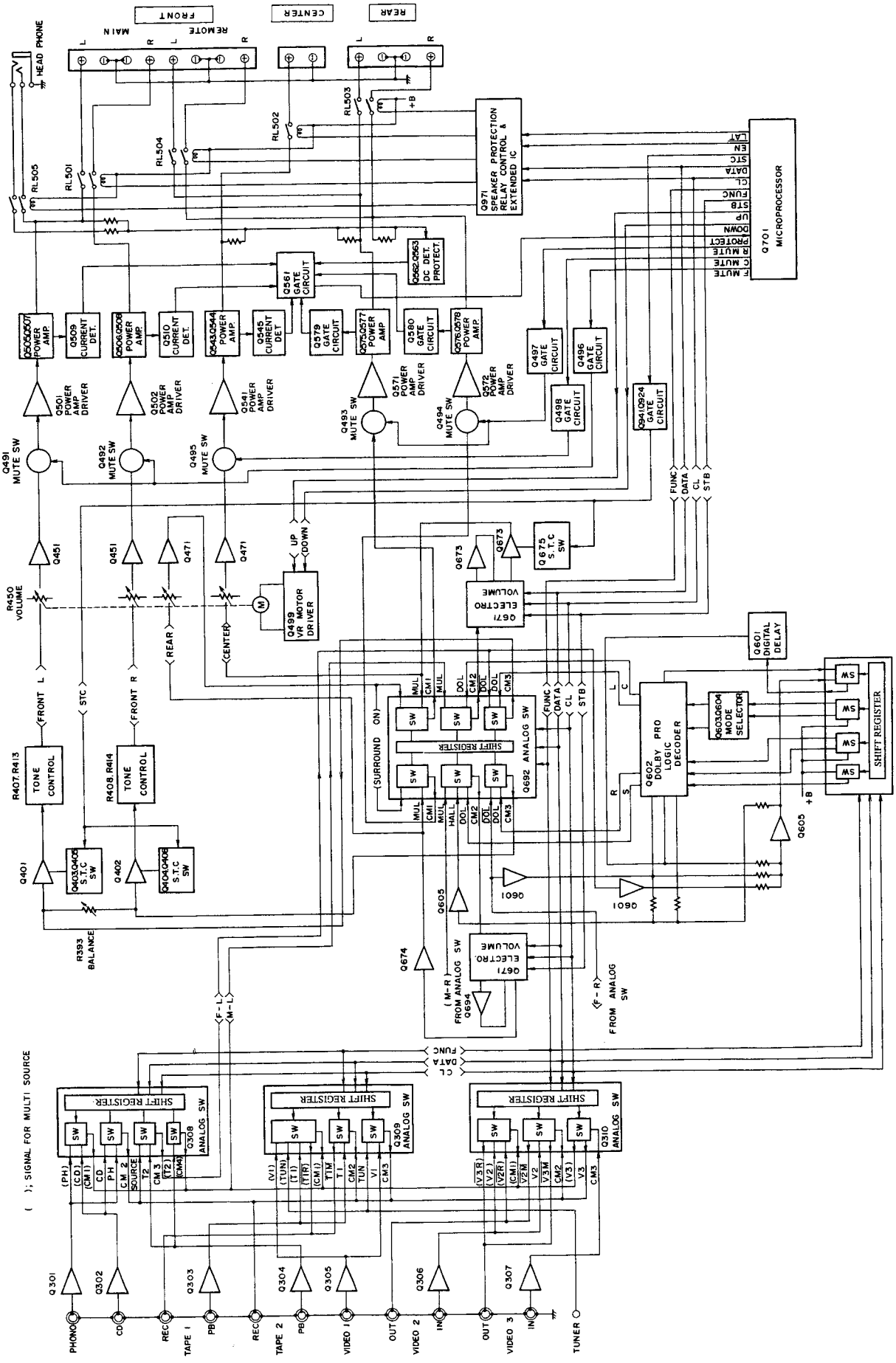
Q971
μPD6345C (Extended IC)



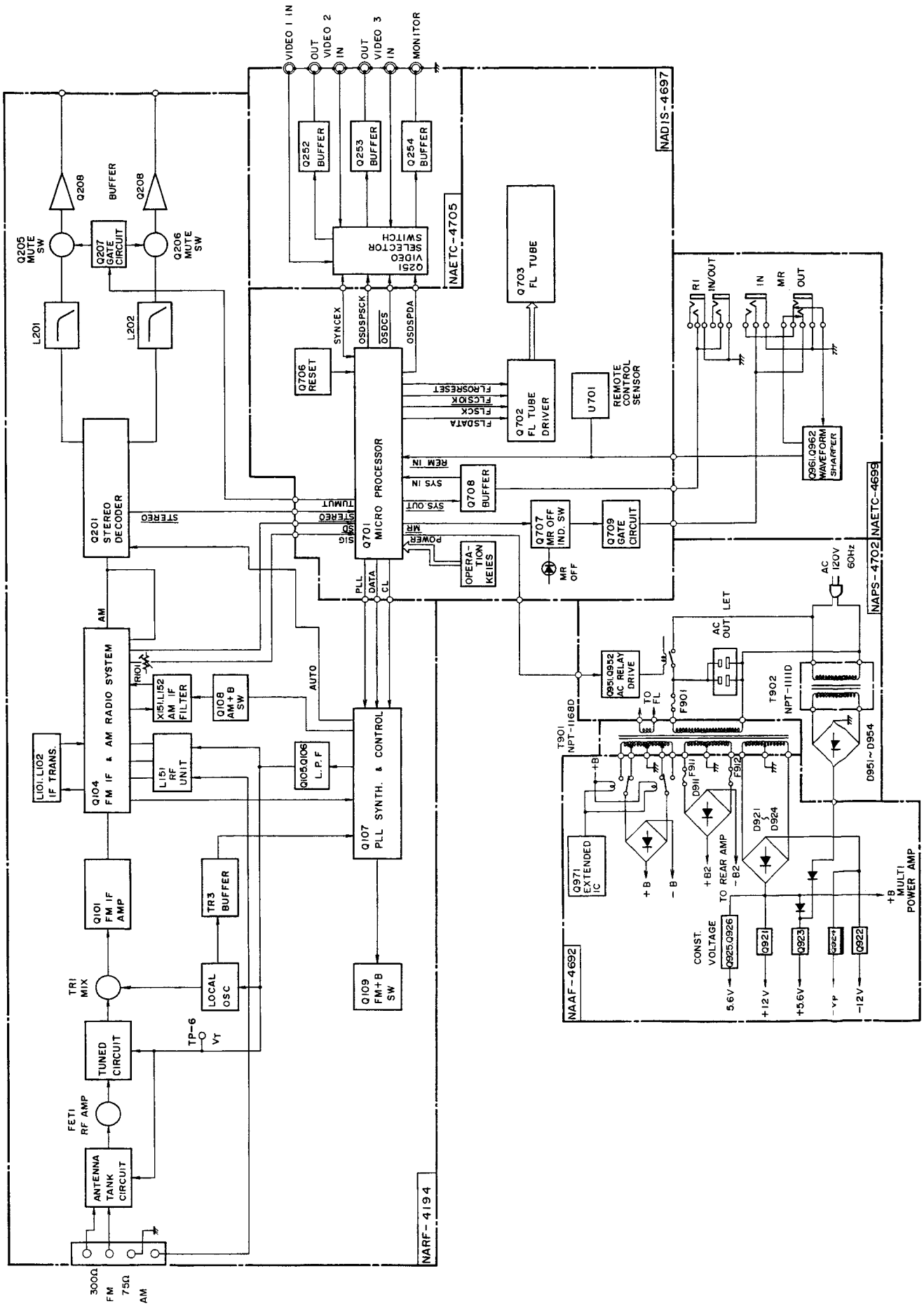
Pin No.	Symbol	Description
1	VSS	Ground terminal
2	EN	Chip enable input terminal. Connect to the terminal EN of the microprocessor.
3	$\overline{LAT}$	Latch input terminal. Connect to the terminal LAT of the microprocessor.
4	SO	Serial data output terminal.Not used.
5	$\overline{O8}$	Not used.
6	$\overline{O7}$	Not used.
7	$\overline{O6}$	Front speaker relay control output terminal
8	$\overline{O5}$	Center speaker relay control output terminal
9	$\overline{O4}$	Rear speaker relay control terminal
10	$\overline{O3}$	Remote speaker relay control terminal
11	$\overline{O2}$	Headphone relay control output terminal
12	$\overline{O1}$	Power supply voltage switch relay control output terminal
13	SIN	Serial data input terminal. Connect to the terminal DATA of the microprocessor.
14	SCK	Serial clock input terminal. Connect to the terminal CLOCK of the microprocessor.
15	$\overline{RESET}$	Reset input terminal
16	VDD	Power supply terminal



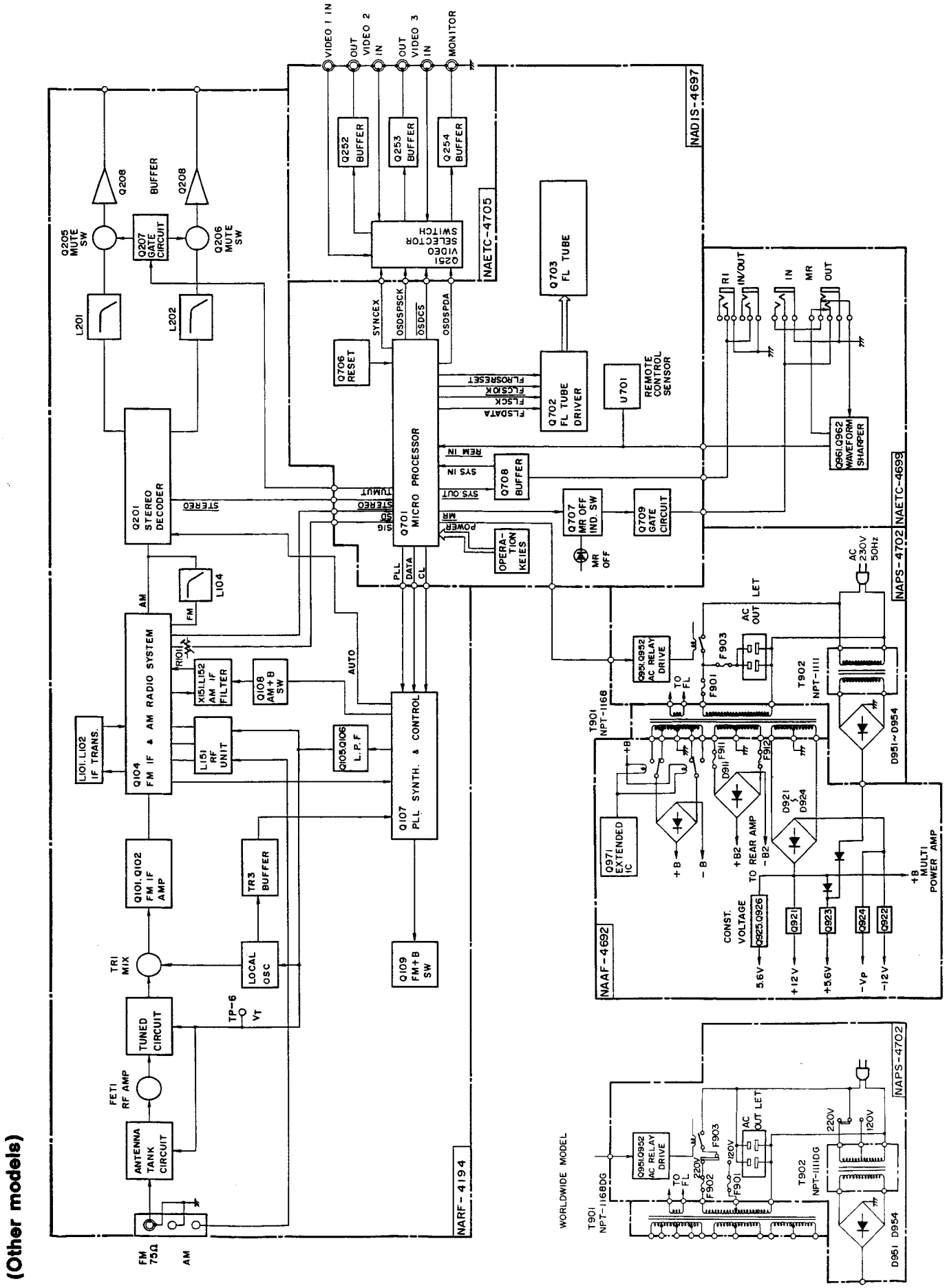
BLOCK DIAGRAM
AMPLIFIER SECTION



BLOCK DIAGRAM
TUNER SECTION (120V model)



(Other models)



ADJUSTMENT PROCEDURES

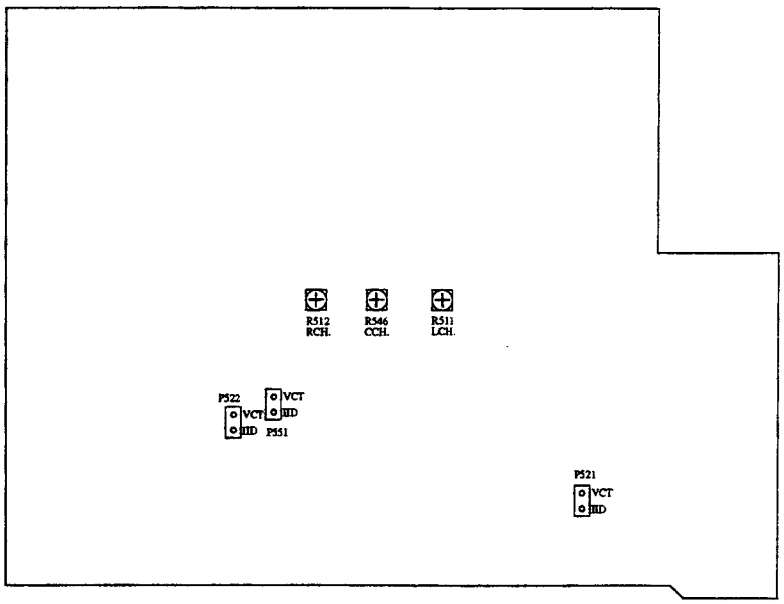
• Preparation

1. Input
   FM mono : 1 kHz, 75kHz devi., 60dB/ μ V
   FM stereo : 1 kHz, 75kHz devi., 60dB/ μ V
   Pilot signal 19kHz 7.5kHz devi.
   AM : 400Hz 30% mod.
2. Outputs
   Connect the non-inductive type resistors of 8ohms to the main speaker, remote speaker, and rear speaker terminals unless otherwise noted.

3. Initializing of unit
1. Press and hold down th CD button, then press the POWER button.
2. "Test-" is displayed on the display for approximately 5 seconds.
3. While "Test-" is displayed, unplug the TX-SV515PROs power cord from its AC outlet, then "Test-" will disappear.
4. Preset memory and parameters stored in memory, such as surround are initialized and will return to the factory settings.

4. Standard Knob Position

TAPE MONITOR 2 ·····OFF
VOLUME·····Maximum
BASS/TREBLE/BALANCE·····Center
MUTING·····OFF
REC SELECTOR·····SOURCE
INPUT SELECTOR·····CD
SPEAKERS·····ON
S.T.C.·····OFF
SURROUND MODE·····OFF
CENTER MODE·····WIDE
DELAY TIME·····20mS
MULTI/REAR LEVEL·····Center
MR OFF·····ON



MAIN CIRCUIT PC BOARD

Amplifier section

Idling Current Adjustment

Connect the DC voltmeter to the terminals P521, P522, and P551 (VCT and IID) on the main circuit pc board. Adjust the trim resistors R511, R512 and R546 so that the indicator of voltmeter becomes 5 ± 0.5mV.
NOTE:Adjust after switching on for 5 minutes.

FM section

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuning frequency	Output indicator	Adjustment point	Adjust for	Remarks
FM IF/RF	1	Fig.1	99.1MHz 1kHz 75kHz devi. 65dBf(60dB)	——	99.1MHz	DC voltmeter	L101	0±20mV	FM MUTE/MODE switch:ON/STEREO Repeat the steps 1 and 3 until no further adjustment is necessary.
	2					AC voltmeter	IFT on the front end	Maximum	
	3					Distortion analyzer	L102	Minimum	
VCO		Fig.2	99.1MHz 1kHz 75kHz devi. 65dBf(60dB)	——	99.1MHz	Frequency counter	R201	19kHz± 10Hz	
Stereo Distortion		Fig.3	99.1MHz Ext. mod.65dBf(60dB)	Channel L or R 1kHz	99.1MHz	Distortion analyzer	IFT on the front end	Minimum	Don't turn more than ±180°
Stereo Separation	1	Fig.3	99.1MHz Ext. mod. 65dBf(60dB)	Channel L 1kHz	99.1MHz	Channel R AC voltmeter	R202	Minimum	Maximum and same separation
	2			Channel R 1kHz		Channel L AC voltmeter		Minimum	
Muting Level		Fig.3	99.1MHz 17.2dBf(12dB) <19.2dBf(14dB)>	——	99.1MHz	Oscilloscope	R101	Signal output	

NOTE:< >:230V and Worldwide models

AM section

120V model

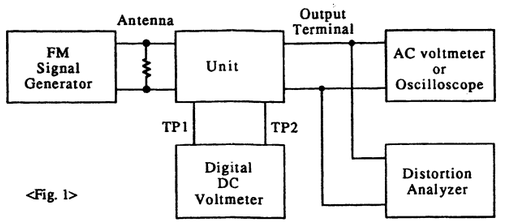
Step	AM SG output	Tuning Frequency	Output Indicator	Adjustment point	Adjust for
1		530kHz	Digital DC voltmeter	OSC coil on RF block L151	1.4±0.2V
2	600kHz 400Hz 30% mod. 60dB/m	600kHz	AC voltmeter	RF coil on RF block L151	Maximum
3	990kHz 400Hz 30% mod. 60dB/m	990kHz	AC voltmeter	L152	Maximum

Reference Specification
FM tuned voltage:87.9MHz-107.9MHz
More than1.3V-Less than 10V
AM tuned voltage:530kHz-1710kHz
1.4±0.2V-Less than 9.0V

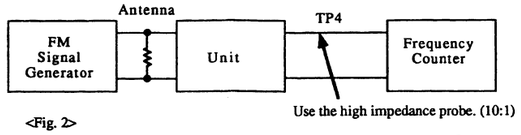
230V and Wolrdwide models

Step	AM SG output	Tuning Frequency	Output Indicator	Adjustment point	Adjust for
1		522kHz or 531kHz	Digital DC voltmeter	OSC coil on RF block L151	1.3±0.2V
2	603kHz 400Hz 30% mod. 60dB/m	603kHz	AC voltmeter	RF coil on RF block L151	Maximum
3	999kHz 400Hz 30% mod. 60dB/m	999kHz	AC voltmeter	L152	Maximum

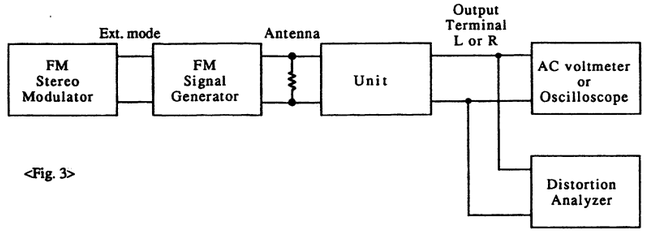
Reference Specification
FM tuned voltage:87.5MHz-108MHz
More than1.3V-Less than 10V
AM tuned voltage:522kHz-1611kHz
1.3±0.2V-Less than 9.0V
(230V model)
AM tuned voltage:531kHz-1602kHz
1.3±0.2V-Less than 9.0V
(Worldwide model)



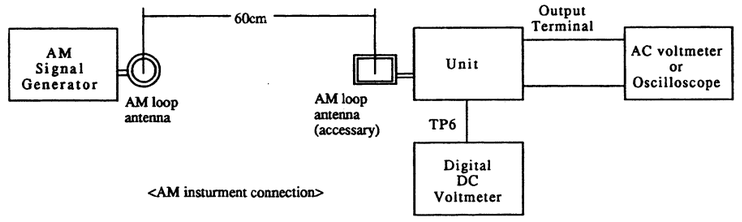
<Fig. 1>



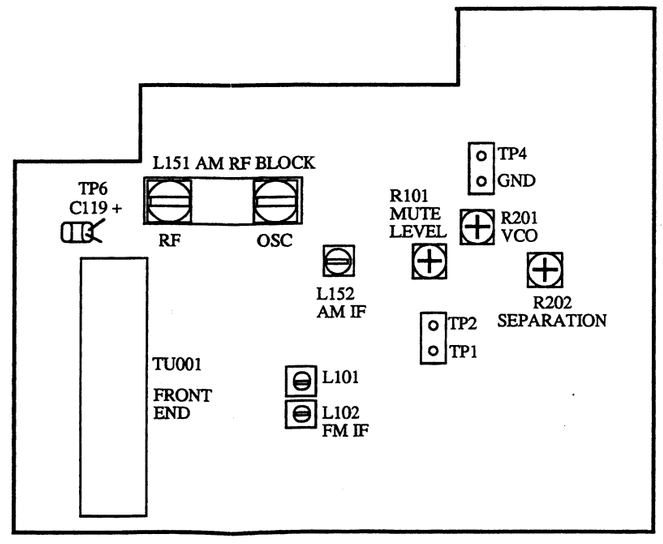
<Fig. 2>



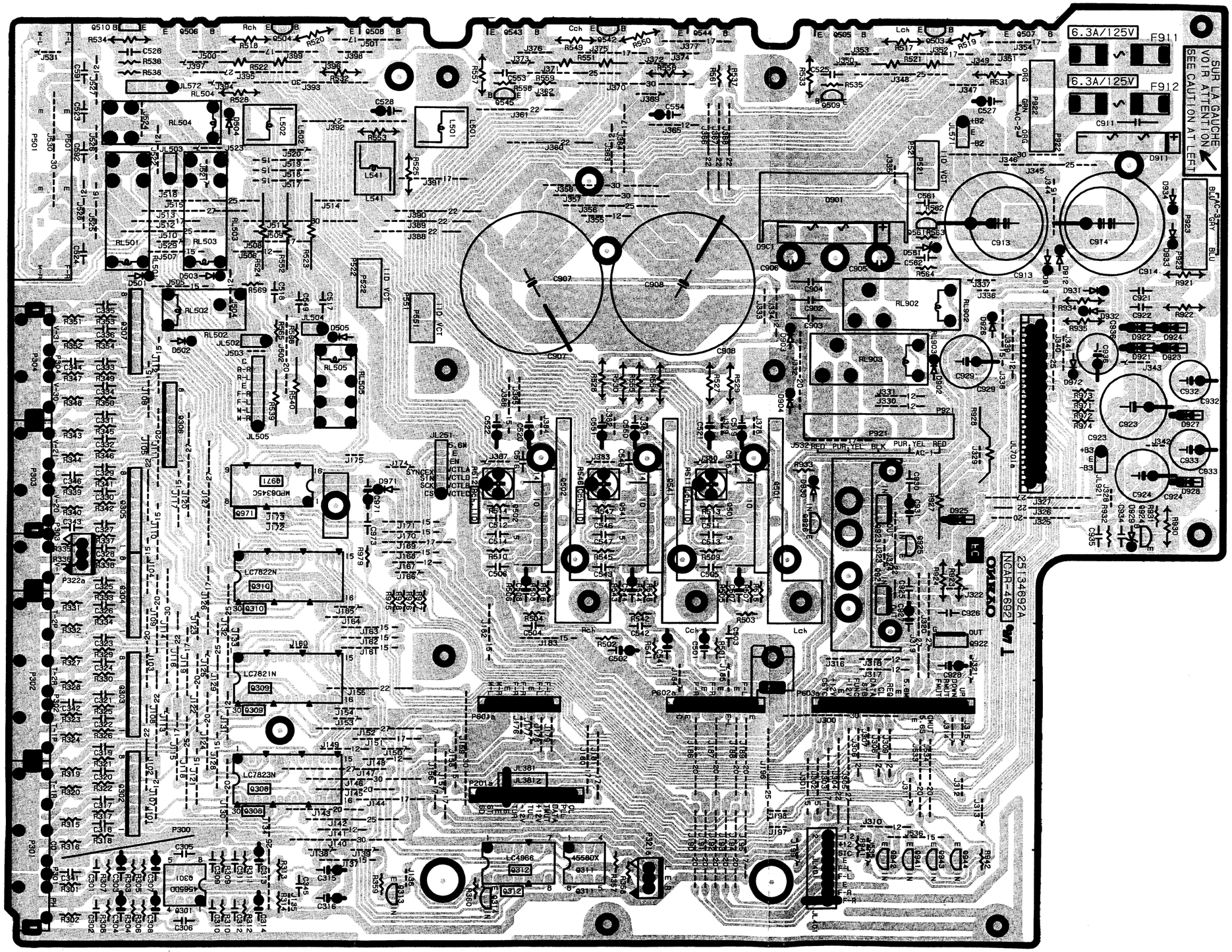
<Fig. 3>



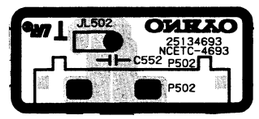
<AM insturment connection>



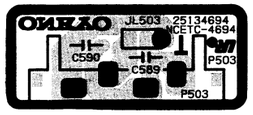
PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE



MAIN CIRCUIT PC BOARD



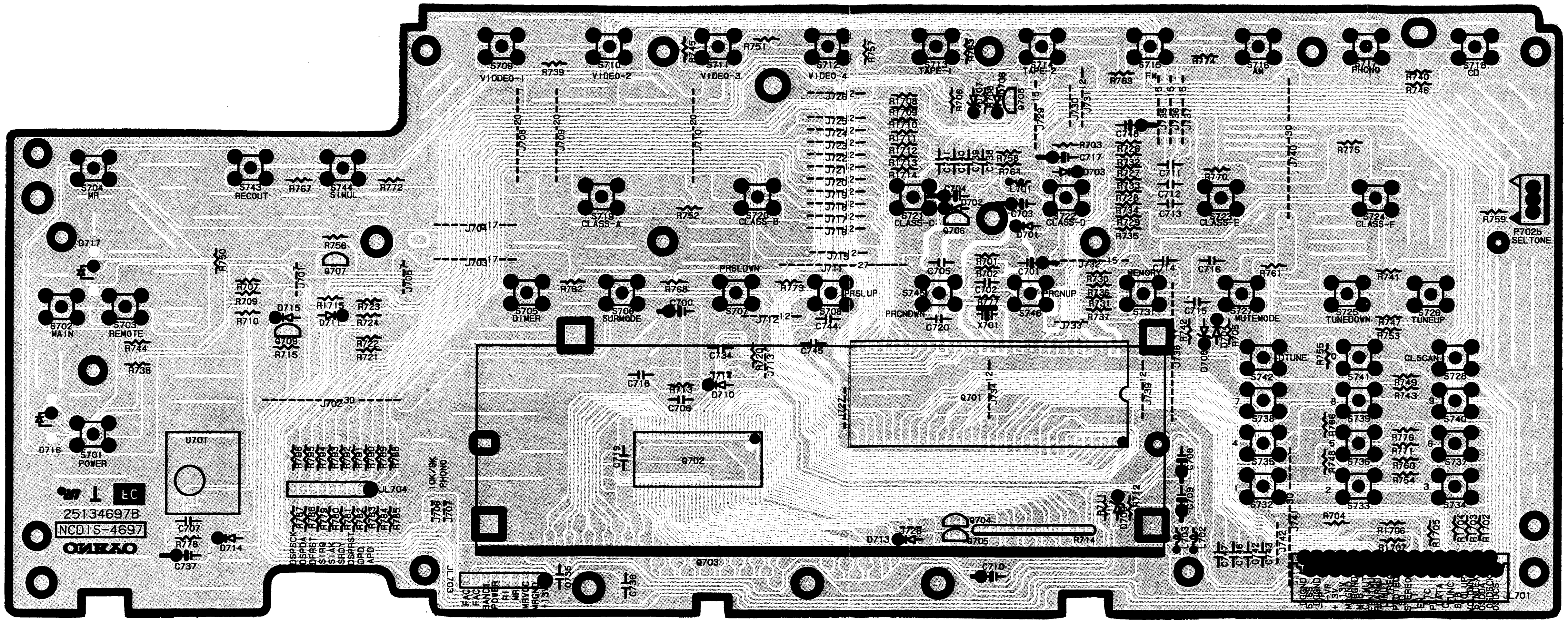
CENTER SPEAKER TERMINAL PC BOARD



SPEAKER TERMINAL PC BOARD

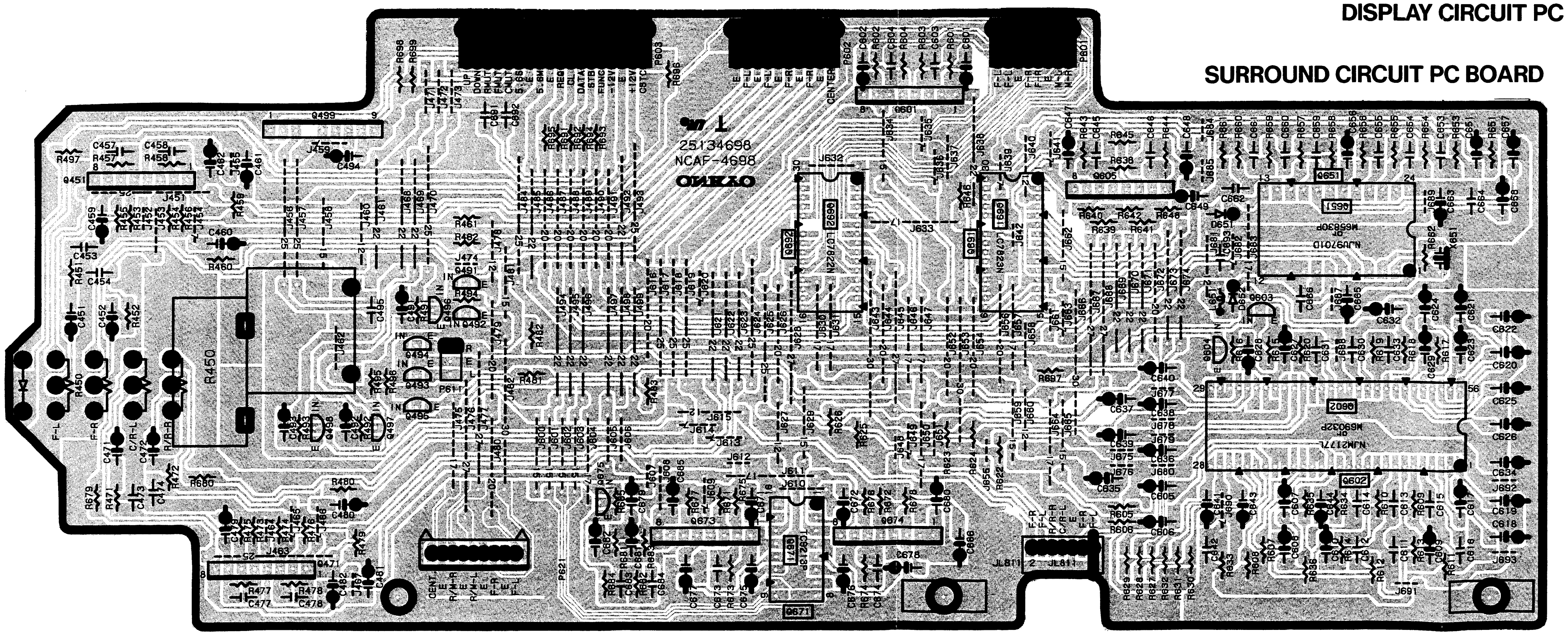
HEADPHONE TERMINAL PC BOARD

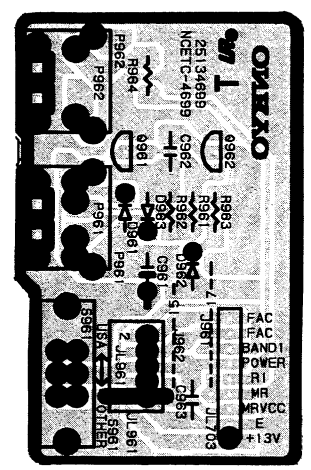
STC SWITCH PC BOARD



DISPLAY CIRCUIT PC BOARD

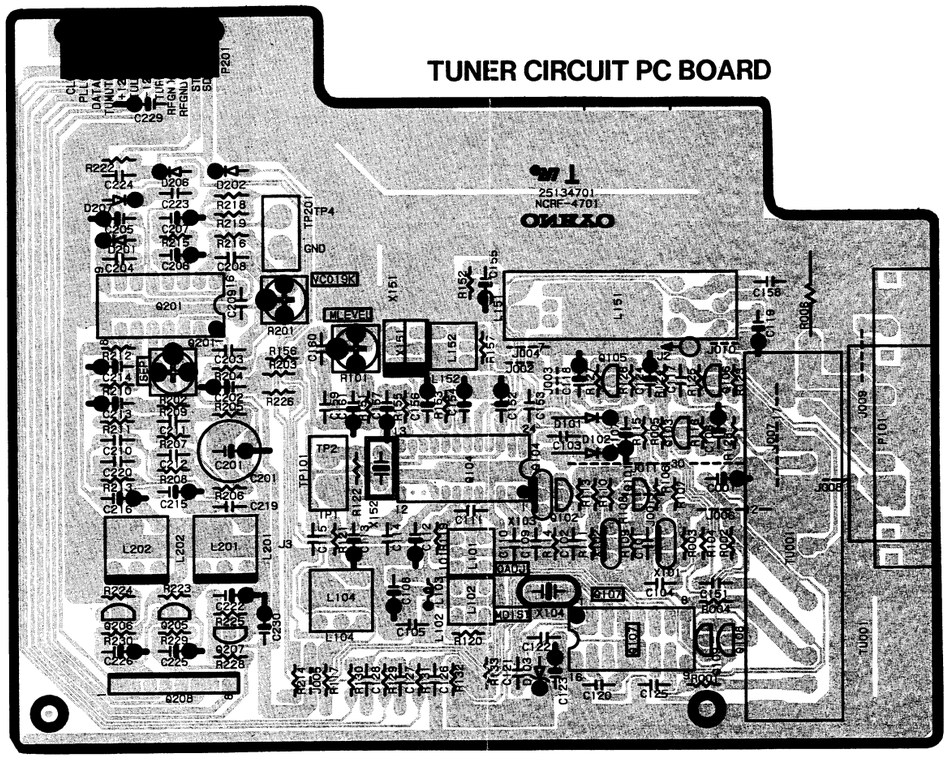
SURROUND CIRCUIT PC BOARD



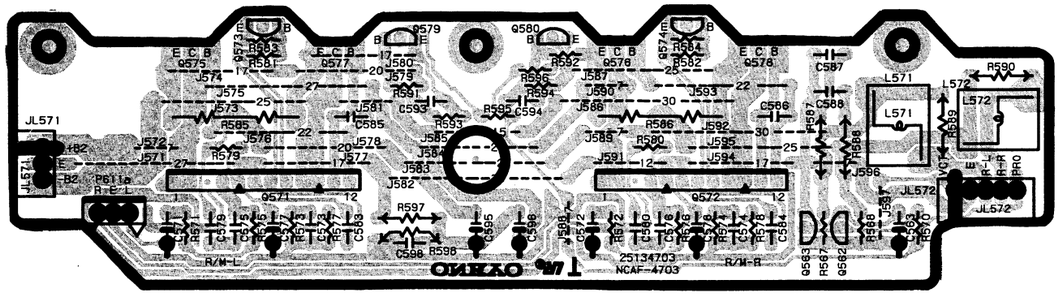


RI/MR TER MINAL PC BOARI

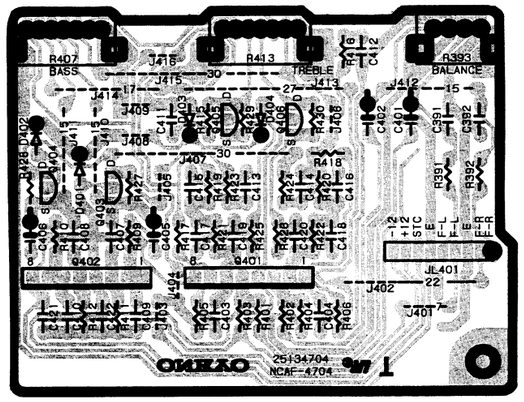
PRINTED CIRCUT BOARD VIEW FROM BOTTOM SIDE



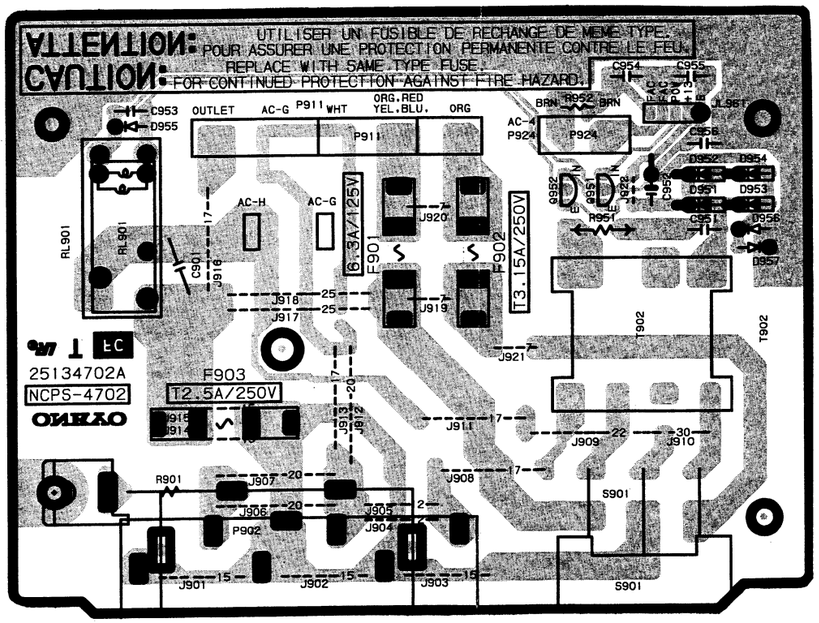
TUNER CIRCUIT PC BOARD



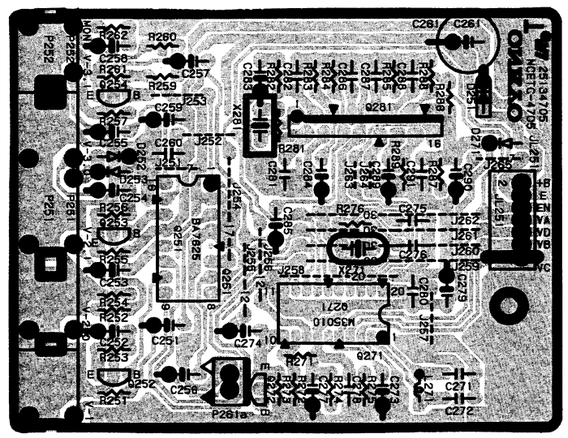
REAR AMPLIFIER PC BOARD



TONE CONTROL CIRCUIT PC BOARD



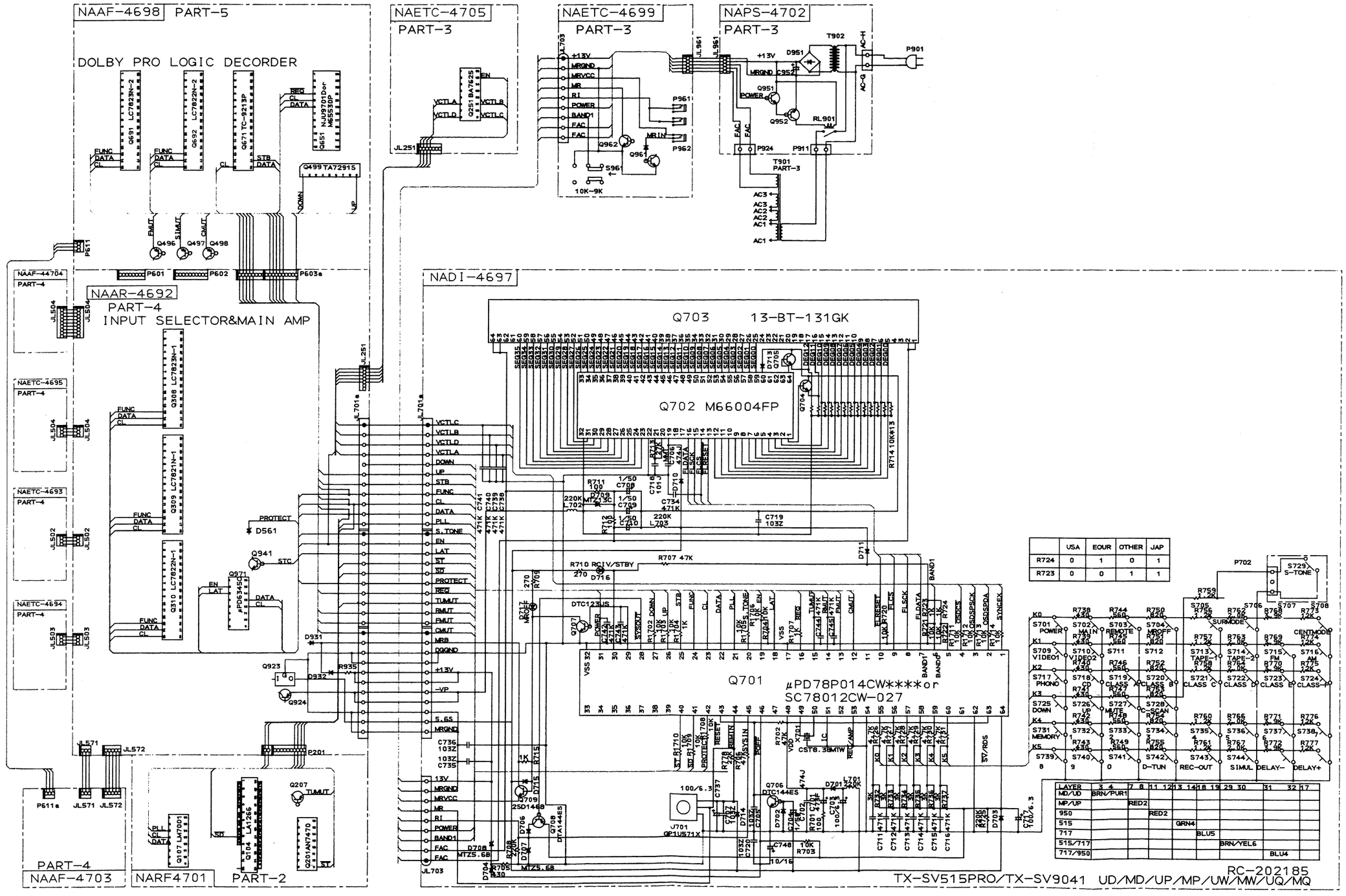
POWER SUPPLY CIRCUIT PC BOARD



VIDEO CIRCUIT PC BOARD

SCHEMATIC DIAGRAM (PART-1)

CONNECTION DIAGRAM OF MICROPROCESSOR



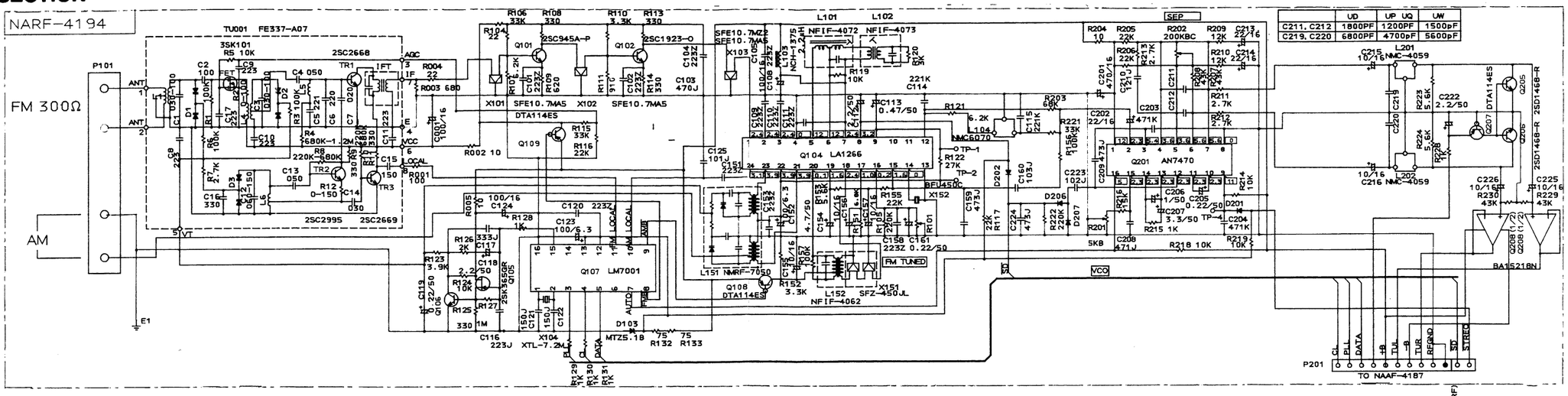
	USA	EOUR	OTHER	JAP
R724	0	1	0	1
R723	0	0	1	1

LAYER	3 4	7 8	11 12	13 14	18 19	29 30	31 32	17
MD/UD	BRN/PUR1							
MP/UP		RED2						
950			RED2					
515				GRN4				
717					BLU5			
515/717						BRN/YEL6		
717/950							BLU4	

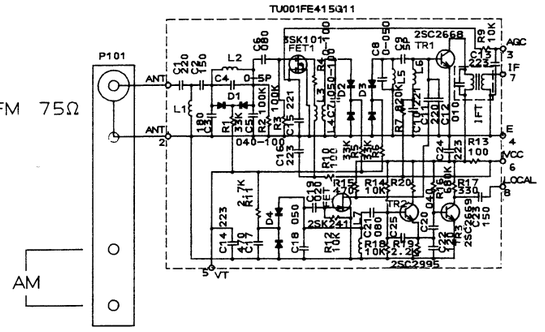
ONKYO CORPORATION

SCHEMATIC DIAGRAM (PART-2)

TUNER SECTION

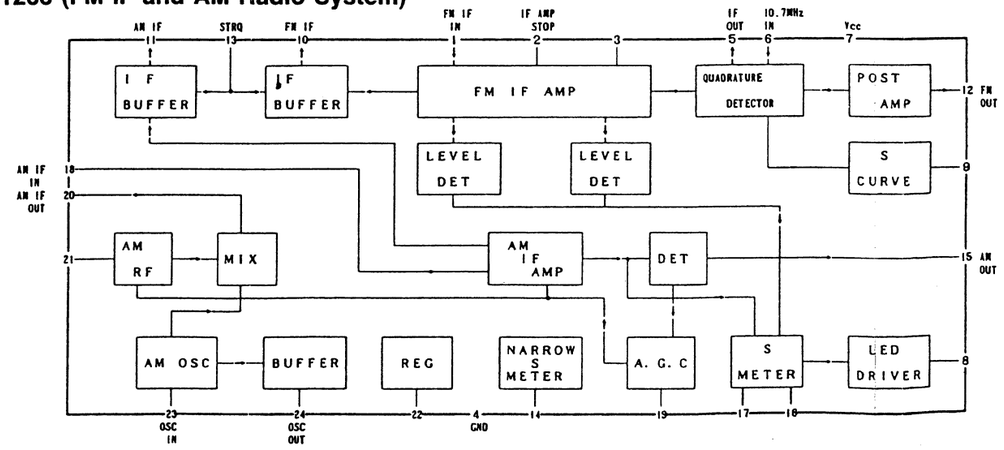


	UD	UP UQ	UW
C211, C212	1800PF	1200PF	1500pF
C219, C220	6800PF	4700pF	5600pF

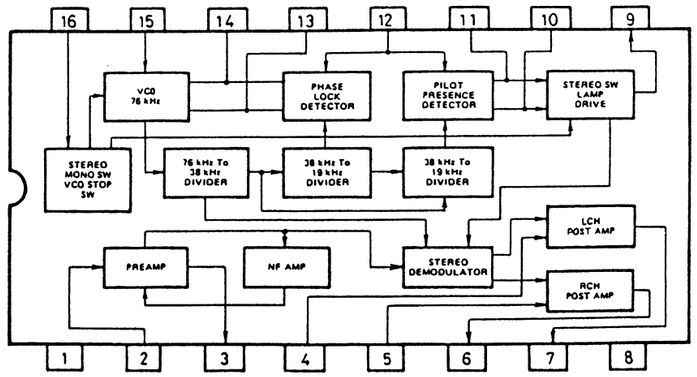


	MD, UD	MP, MW, MQ UP, UW, UQ
Q101 X102 R106–109 R121 R221 C101 C115	No parts	○
R203	○	No parts
R111	910Ω	560Ω
TU001	FE337-A07	FE415-Q11
X103	SFE10.7MA	SFE10.7MZ2
X101 OUT–Q102 Emitter	Sorted with J001	

Q401
LA1266 (FM IF and AM Radio System)



Q201
AN7470 (FM Stereo Decoder)



ONKYO CORPORATION

SCHEMATIC DIAGRAM (PART-3)

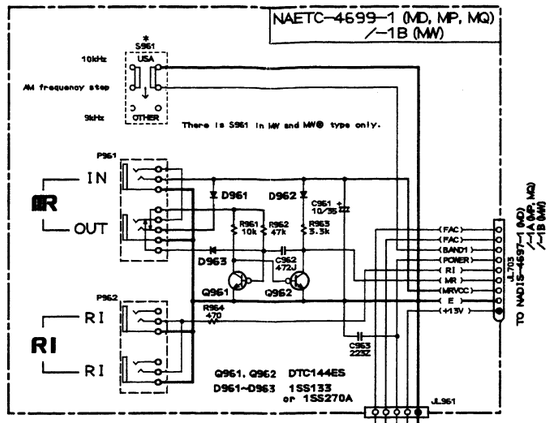
POWER SUPPLY AND VIDEO SECTION

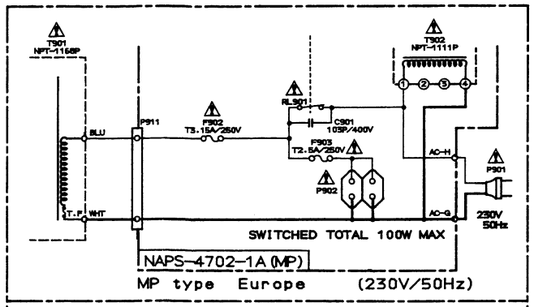
MD type : 120V/60Hz Area
MD⊗ type : U.S.A.
MD◎ type : Canada

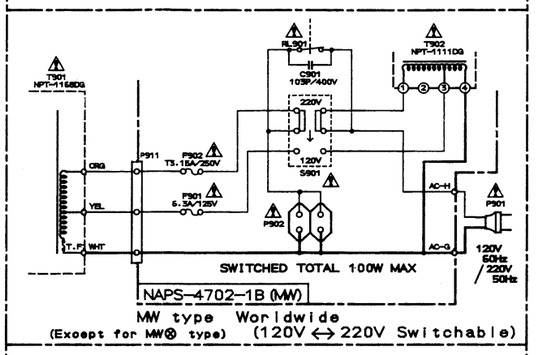
MP type : 230V/50Hz Area
MP type : Europe (except for Germany)
MP⊗ type : Germany (MODEL No. TX-SV9041)

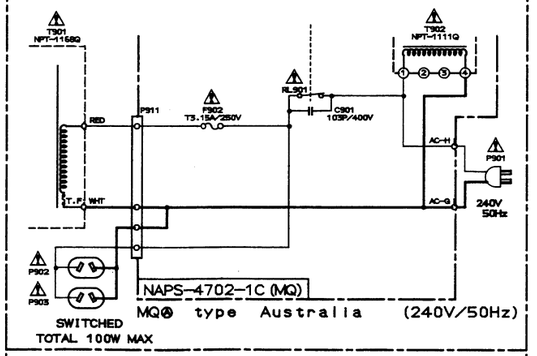
MW type : 120V or 220V Switchable
MW type : Worldwide
MW⊗ type : For PX

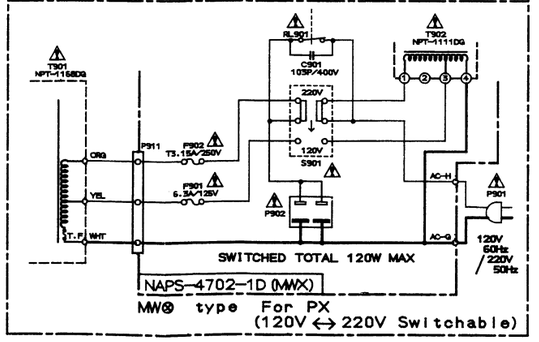
MQ type : 240V/50Hz Area
MQ⊗ type : Australia

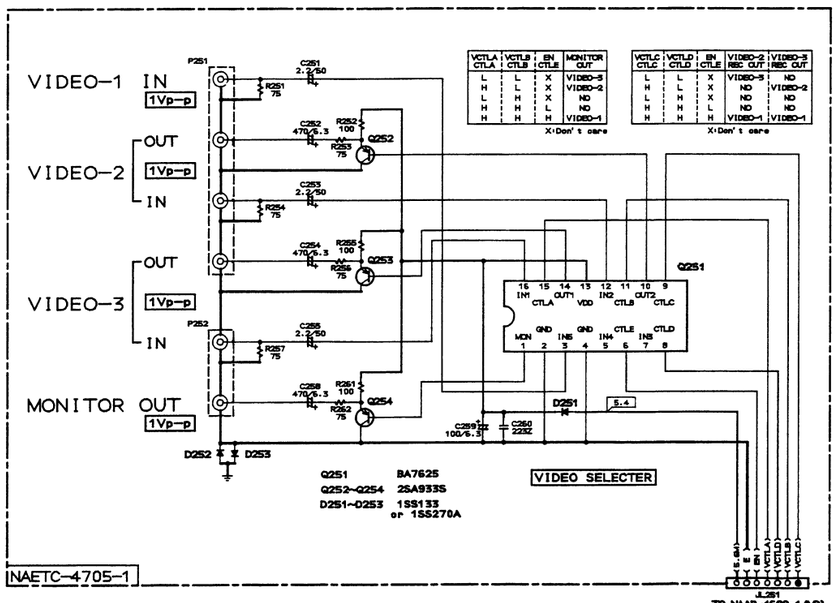


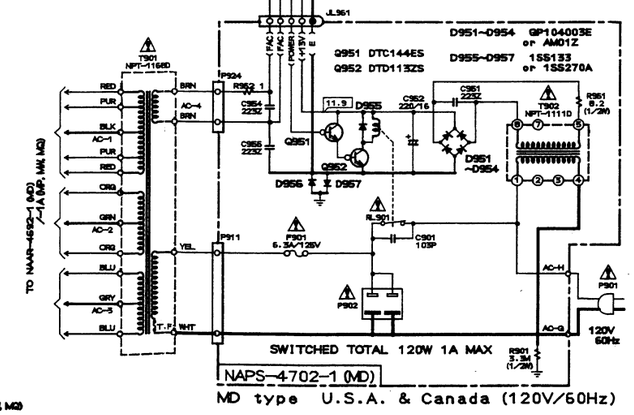










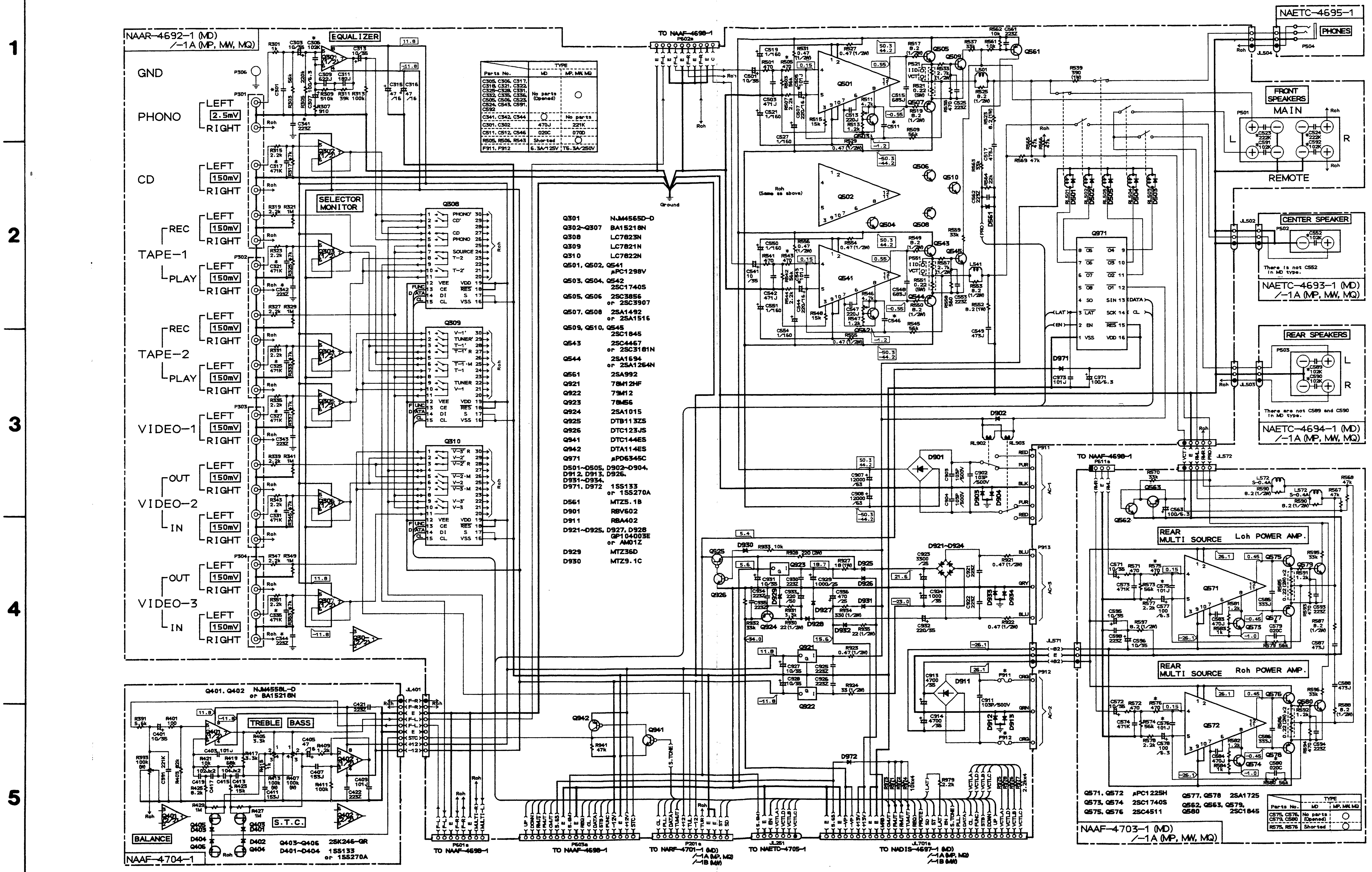


TX-SV515PRO

A B C D E F G

SCHEMATIC DIAGRAM (PART-4)

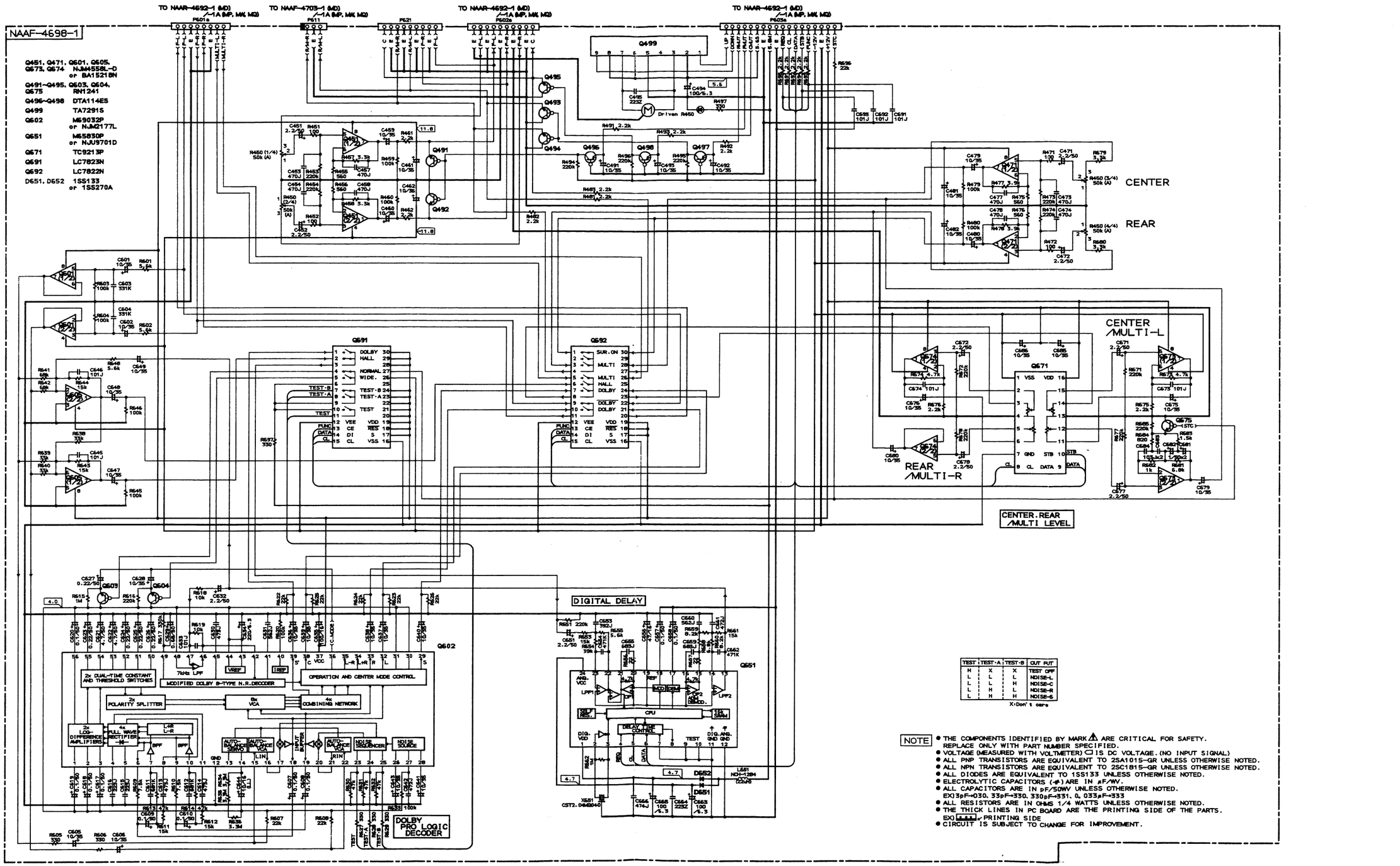
AUDIO SECTION



ONKYO CORPORATION

SCHEMATIC DIAGRAM (PART-5)

SURROUND SECTION



ONKYO CORPORATION

PRINTED CIRCUIT BOARD PARTS LIST

CAUTION:Replacement for transistor of mark *,if necessary, must be made from the same beta group (H FE) as the original type.

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

MAIN CIRCUIT PC BOARD (NAAR-4692-1/1A)

CIRCUIT NO.	PART NO.		DESCRIPTION
	ICs		
Q301	22240191		NJM4565D-D
Q302-Q307	22240247		BA15218N
Q308	22240339		LC7823N
Q309	22240280		LC7821N
Q310	22240270		LC7822N
Q501,Q502	22240311		μPC1298V
Q541	22240311		μPC1298V
Q921	222780125NEC		78M12HF
Q922	222790125		79M12
Q923	222780565JRC		78M56
Q971	22240211		μPD6345C
	Transistors		
Q503,Q504	2213284		2SC1740S-R
Q505,Q506	2201653,	*	2SC3856-O,
	2201654,	*	2SC3856-Y,
	2201655,	*	2SC3856-P,
	2202272 or	*	2SC3907-R or
	2202273	*	2SC3907-O
Q507,Q508	2201663,	*	2SA1492-O,
	2201664,	*	2SA1492-Y,
	2201665,	*	2SA1492-P,
	2202262 or	*	2SA1516-R or
	2202263	*	2SA1516-O
Q509,Q510	2211732 or		2SC1845-F or
Q542	2213284		2SC1740S-R
Q543	2202253,	*	2SC4467-O,
	2202254,	*	2SC4467-Y,
	2202256,	*	2SC4467-P,
	2202502 or	*	2SC3181N-R or
	2202503	*	2SC3181N-O
Q544	2202243,	*	2SA1694-O,
	2202244,	*	2SA1694-Y,
	2202246,	*	2SA1694-P,
	2202492 or	*	2SA1264N-R or
	2202493	*	2SA1264N-O
Q545	2211733		2SC1845-E
Q561	2211792 or		2SA992-F or
	2211793		2SA992-E
Q924	2211455		2SA1015-GR
Q925	2213830		DTB113ZS
Q926	2213640		DTC123JS
Q941	221282		DTC144ES
Q942	2213510		DTA114ES
	Diodes		
D501-D505	223205 or		1SS270A or
D902-D904	223163		1SS133
D561	224450512		MTZ5.1B
D901	22380038		RBV602
D911	22380048		RBA402

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diodes	
D912,D913	223205 or	1SS270A or
D926	223163	1SS133
D921-D925	22380046 or	AM01Z or
D927,D928	22380035	GP104003E
D929	224453604	MTZ36D
D930	224450913	MTZ9.1C
D931-D934	223205 or	1SS270A or
D971,D972	223163	1SS133
	Coils	
L501,L502	231209S	S-0.4A
L541	231209S	S-0.4A
	Capacitors	
C303,C304	354761009	10μF,35V,Elect.
C307,C308	354721019	100μF,6.3V,Elect.
C309,C310	374726224	6200pF±5%,50V,Plastic
C311,C312	374721824	1800pF±5%,50V,Plastic
C313,C314	354761009	10μF,35V,Elect.
C315,C316	354744709	47μF,16V,Elect.
C501,C502	354761009	10μF,35V,Elect.
C503,C504	374724714	470pF±5%,50V,Plastic
C507,C508	354742219	220μF,16V,Elect.
C515,C516	374726834	0.068μF±5%,50V,Plastic
C517,C518	374724734	0.047μF±5%,50V,Plastic
C519-C522	354700109	1μF,160V,Elect.
C527,C528	354700109	1μF,160V,Elect.
C541	354761009	10μF,35V,Elect.
C542	374724714	470pF±5%,50V,Plastic
C544	354742219	220μF,16V,Elect.
C548	374726834	0.068μF±5%,50V,Plastic
C549	374724734	0.047μF±5%,50V,Plastic
C550,C551	354700109	1μF,160V,Elect.
C554	354700109	1μF,160V,Elect.
C907,C908	3504258	12000μF,63V,Elect.
C913,C914	3504213	4700μF,35V,Elect.
C923	354753329	3300μF,25V,Elect.
C924	354761029	1000μF,35V,Elect.
C927,C928	354761009	10μF,35V,Elect.
C929	354751029	1000μF,25V,Elect.
C931	354761009	10μF,35V,Elect.
C932	354762219	220μF,35V,Elect.
C933	354782219	220μF,50V,Elect.
C936	354754719	470μF,25V,Elect.
C971	354721019	100μF,6.3V,Elect.
	Resistors	
R511,R512	5210261	N06HR 5KBC,Trim
R517-R520	452530824	8.2 ohm,1/2W,Metal
R521,R522	4000132Y	0.22 ohm×2,5W+5W,Metal plate
R523-R526	451630824	8.2 ohm,1W,Metal
R527-R532	452534794	0.47 ohm,1/2W,Metal
R533,R534	442522724	2.7 kohm,1/2W,Metal oxide

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resistors	
R539,R540	441623914	390 ohm,1W,Metal oxide
R546	5210261	N06HR 5KBC,Trim
R549,R550	452530824	8.2 ohm,1/2W,Metal
R551	4000132Y	0.22 ohm×2,5W+5W,Metal plate
R552	451630824	8.2 ohm,1W,Metal
R553	452530824	8.2 ohm,1/2W,Metal
R554-R556	452534794	0.47 ohm,1/2W,Metal
R557	442522724	2.7 kohm,1/2W,Metal oxide
R921-R923	452534794	0.47 ohm,1/2W,Metal
R924	442523304	33 ohm,1/2W,Metal oxide
R927	441621804	18 ohm,1W,Metal oxide
R928	441722214	220 ohm,2W,Metal oxide
R930,R935	442522204	22 ohm,1/2W,Metal oxide
R934	442523314	330 ohm,1/2W,Metal oxide
	Relaies	
RL501	25065339	NRL-2P5A-DC24-046
RL502	25065379	NRL-1P5A-DC24-058
RL503,RL504	25065339	NRL-2P5A-DC24-046
RL505	25065470	NRL-2P1.25A-DC24-079
RL902,RL903	25065435	⚠ NRL-1P10A-DC24-072
	Fuses	
F911,F912	252166Y	⚠ 6.3A-UL/T-237 <D>
	252079	⚠ 6.3A-SE-EAK <P/W/Q>
	Fuseholders	
F911A,F912A	25050065	⚠ YSH403T
	Plugs	
P201A	25055500	NPLG-12P475
P601A	25055498	NPLG-8P473
P602A	25055499	NPLG-10P474
P603A	25055503	NPLG-18P478
	Terminals	
P301-P303	25045300	NPJ-6PDBL-159
P304	25045303	NPJ-4PDBL-162
P501	25060125	NTM-8PDMN058
	Wire traps	
JL401	25050531	NSCT-9P354
JL701A	25050612 or	NSCT-32P423 or
	25050705	NSCT-32P509

CENTER SPEAKER TERMINAL PC BOARD (NAETC-4693-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
P502	25060114	NTM-2PDML-048,Speaker terminal

SPEAKER TERMINAL PC BOARD (NAETC-4694-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
P503	25060161	NTM-4PDML-087,Speaker terminal

HEADPHONE TERMINAL PC BOARD (NAETC-4695-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
P504	25045255	YKB26-5009,Headphone terminal

DISPLAY CIRCUIT PC BOARD (NADIS-4697-1/1A/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Remote control sensor	
U701	24130007	GP1U571X
	FL tube	
Q703	212120	13-BT-131GK
	ICs	
Q701	22240684	SC78012CW-027
Q702	22240685R9	M66004FP
	Transistors	
Q704,Q705	2213284	2SC1740S-R
Q706	221282	DTC144ES
Q707	2213640	DTC123JS
Q708	2213510	DTA114ES
Q709	2212794	2SD1468-R
	Diodes	
D701-D704	223205 or	1SS270A or
D706,D710	223163	1SS133
D707,D708	224450562	MTZ5.6B
D709	224451303	MTZ13C
D711	223205 or	1SS270A or
	223163	1SS133 <P/W/Q>
D713-D715	223205 or	1SS270A or
	223163	1SS133
D716,D717	225142	SEL2913K,LED
	Resonator	
X701	3010205	CST8.38MTW
	Coils	
L701-L703	233411K220	NCH-1387
	Capacitors	
C701	3000059	0.047F,5.5V,Super
C702,C706	375524744	0.47μF±5%,50V,Plastic
C703	353721019	100μF,6.3V,Elect.
C704	353780109	1μF,50V,Elect.
C708-C710	353780109	1μF,50V,Elect.
C717,C737	353721019	100μF,6.3V,Elect.
C748	353741009	10μF,16V,Elect.
	Resistor	
R714	49163103413	10 kohm×13,1/10W,Array
	Switches	
S701-S704	25035548	NPS-111-S510
S706,S708	25035548	NPS-111-S510
S710-S728	25035548	NPS-111-S510
S731-S746	25035548	NPS-111-S510
	Wire trap	
JL701B	25050578	NSCT-32P389
	Plug	
P702A	25055510	NPLG-3P485
	Socket	
Q701B	25050912	NSCT-64P699
	Holders	
D712A,D716A	27190843	
Q703A	27190913Y	

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

SURROUND CIRCUIT PC BOARD (NAAF-4698-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q451,Q471	22240247 or	BA15218N or
	22240293	NJM4558L-D
Q499	22240239	TA7291S
Q601,Q605	22240247 or	BA15218N or
Q673,Q674	22240293	NJM4558L-D
Q602	22240683 or	NJM2177L or
	22240692	M69032P
Q651	22240686 or	M65830P or
	22240687	NJU9701D
Q671	22240266	TC9213P
Q691	22240339	LC7823N
Q692	22240270	LC7822N
	Transitors	
Q491-Q495	2213631 or	RN1241-A or
Q603,Q604	2213632	RN1241-B
Q496-Q498	2213510	DTA114ES
Q675	2213631 or	RN1241-A or
	2213632	RN1241-B
	Diodes	
D651,D652	223205 or	1SS270A or
	223163	1SS133
	Coil	
L651	233411K220	NCH-1387
	Resonator	
X651	3010217	CST2.04MG040,Ceramic
	Capacitors	
C451,C452	354780229	2.2 μ F,50V,Elect.
C459-C462	354761009	10 μ F,35V,Elect.
C471,C472	354780229	2.2 μ F,50V,Elect.
C479-C482	354761009	10 μ F,35V,Elect.
C491-C493	354761009	10 μ F,35V,Elect.
C494	354721019	100 μ F,6.3V,Elect.
C601,C602	354761009	10 μ F,35V,Elect.
C605,C606	354761009	10 μ F,35V,Elect.
C607-C610	353781099	0.1 μ F,50V,Elect.
C613,C614	374724734	0.047 μ F±5%,50V,Plastic
C615,C616	374722234	0.022 μ F±5%,50V,Plastic
C617-C620	353781099	0.1 μ F,50V,Elect.
C621,C622	354780479	4.7 μ F,50V,Elect.
C623-C627	353782299	0.22 μ F,50V,Elect.
C628	354761009	10 μ F,35V,Elect.
C629	354786899	0.68 μ F,50V,Elect.
C630	374724734	0.047 μ F±5%,50V,Plastic
C631,C660	374725624	5600pF±5%,50V,Plastic
C632,C651	354780229	2.2 μ F,50V,Elect.
C634	354722219	220 μ F,6.3V,Elect.
C635	354741019	100 μ F,16V,Elect.
C636-C641	354761009	10 μ F,35V,Elect.
C642,C661	374724724	4700pF±5%,50V,Plastic
C643	354761009	10 μ F,35V,Elect.
C644	392841007	10 μ F,16V,Elect.
C647-C649	354761009	10 μ F,35V,Elect.
C653	374723924	3900pF±5%,50V,Plastic
C655,C659	374726834	0.068 μ F±5%,50V,Plastic
C656	354744709	47 μ F,16V,Elect.
C657,C658	353781099	0.1 μ F,50V,Elect.
C663,C665	354721019	100 μ F,6.3V,Elect.
C666	375524744	0.47 μ F±5%,50V,Plastic
C671,C672	354780229	2.2 μ F,50V,Elect.
C675,C676	354761009	10 μ F,35V,Elect.
C677,C678	354780229	2.2 μ F,50V,Elect.
C679,C680	354761009	10 μ F,35V,Elect.
C681,C682	354780109	1 μ F,50V,Elect.
C683,C684	374721034	0.01 μ F±5%,50V,Plastic
C685,C686	354761009	10 μ F,35V,Elect.
	Resistor	
R450	5144017Y	N16RQL50KA25F,Variable,Volume
	Sockets	
P601	25050445	NSCT-8P269
P602	25050446	NSCT-10P270
P603	25050450	NSCT-18P274
P611	2000802	NSAS-6P758
	Plug	
P621	25055411	NPLG-9P393

RI/MR TERMINAL PC BOARD (NAETC-4699-1/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Transistors	
Q961,Q962	221282	DTC144ES
	Diodes	
D961-D963	223205 or	1SS270A or
	223163	1SS133
	Capacitors	
C961	354761009	10 μ F,35V,Elect.
C962	374724724	4700pF±5%,50V,Plastic
	Jacks	
P961	25045293	HSJ-1003-01-012
P962	25045172	HSJ-1003-01-020
	Switch	
S961	25065286	NSS-22112,AM band <W>
	Wire trap	
JL961	25050527	NSCT-5P350

STC SWITCH PC BOARD (NASW-4700-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
S729	25035548	NPS-111-S510,Switch
P702B	25050454	NSCT-3P278,Socket

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

TUNER CIRCUIT PC BOARD (NARF-4701-1/1A/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Front end	
TU001	240088	FE337-A07 <D>
	240089	FE415-G11 <P/W/Q>
	ICs	
Q104	22240039	LA1266
Q107	22240090	LM7001
Q201	22240242	AN7470
Q208	22240247 or	BA15218N or
	22240293	NJM4558L-D
	Transistors	
Q101	2210746	2SC945A-P <P/W/Q>
Q102	2211723	2SC1923-O
Q105	2212445	2SK365-GR
Q106	2213284	2SC1740S-R
Q108,Q109	2213510	DTA114ES
Q205,Q206	2212794	2SD1468-R
Q207	2213510	DTA114ES
	Diodes	
D103	224450512	MTZ5.1B
D201,D202	223205 or	1SS270A or
D206,D207	223163	1SS133
	Coils and transformers	
L101	233401	NFIF-4072
L102	233402	NFIF-4073
L103	233411M022	NCH-1375
L104	233383	NMC-6070 <P/W/Q>
L151	232148	NMRF-7050
L152	232139	NMIF-4062
L201,L202	233355A	NMC-4059
	Ceramic filters	
X101	3010071	SFE10.7MA5
X102	3010071	SFE10.7MA5 <P/W/Q>
X103	3010071	SFE10.7MA5 <D>
	3010130	SFE10.7MZ2A <P/W/Q>
X151	3010123	SFZ-450JL
X152	3010076	BFU-450C
	Resonator	
X104	3010158 or	XTL-7.2M,
	3010141	Crystal
	Capacitors	
C001	354741019	100 μ F,16V,Elect.
C108,C124	354741019	100 μ F,16V,Elect.
C112,C118	354780229	2.2 μ F,50V,Elect.
C113	354784799	0.47 μ F,50V,Elect.
C117	374723334	0.033 μ F±5%,50V,Plastic
C119,C161	353782299	0.22 μ F,50V,Elect.
C123,C152	354721019	100 μ F,6.3V,Elect.
C154	354780479	4.7 μ F,50V,Elect.
C155-C157	354761009	10 μ F,35V,Elect.
C159	374724734	0.047 μ F±5%,50V,Plastic
C160	374721034	0.01 μ F±5%,50V,Plastic
C201	354744719	470 μ F,16V,Elect.
C202	354742209	22 μ F,16V,Elect.
C205	354782299	0.22 μ F,50V,Elect.
C206	354780109	1 μ F,50V,Elect.
C207	354780339	3.3 μ F,50V,Elect.
C208	370134714	470pF±5%,100V,Plastic
C209,C224	374724734	0.047 μ F±5%,50V,Plastic
C211,C212	374721824	1800pF±5%,50V,Plastic <D>
	374721224	1200pF±5%,50V,Plastic <P/Q>
	374721524	1500pF±5%,50V,Plastic <W>
C213,C214	354742209	22 μ F,16V,Elect.
C215,C216	354761009	10 μ F,35V,Elect.
C219,C220	374726824	6800pF±5%,50V,Plastic <D>
	374724724	4700pF±5%,50V,Plastic <P/Q>
	374725624	5600pF±5%,50V,Plastic <W>
C222	354780229	2.2 μ F,50V,Elect.
C223	374721024	1000pF±5%,50V,Plastic <D>
	338324715	470pF±10%,50V,Ceramic <P/W/Q>
C225,C226	354761009	10 μ F,35V,Elect.
	Trim resistors	
R101	5210266	N06HR100KBC
R201	5210261	N06HR5KBC
R202	5210267	N06HR200KBC
	Terminal	
P101	25060160	NTM-4PDMN086 <D>
	25060117	NTM-2PDMN051 <P/W/Q>
	Socket	
P201	25050447	NSCT-12P271

POWER SUPPLY CIRCUIT PC BOARD (NAPS-4702-1/1A/1B/1C/1D)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Transistors	
Q951	221282	DTC144ES
Q952	2213650	DTD113ZS
	Diodes	
D951-D954	22380046 or	AM01Z or
	22380035	GP104003E
D955-D957	223205 or	1SS270A or
	223163	1SS133
	Power transformer	
T902	2300670Y	⚠ NPT-1111D <D>
	2300671Y	⚠ NPT-1111P <P>
	2300672Y	⚠ NPT-1111DG <W>
	2300673Y	⚠ NPT-1111Q <Q>
	Relay	
RL901	25065248	⚠ NRL-1P15A-DC12-29
	Capacitors	
C901	3500065A	⚠ DE7150FZ103PAC400/125V,IS
C952	354742219	220 μ F,16V,Elect.

CAUTION:Replacement for transistor of mark *,if necessary, must be made from the same beta group (H FE) as the original type.

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

CIRCUIT NO.	PART NO.		DESCRIPTION
	Resistors		
R901	431523355	⚠	3.3 Mohm,1/2W,Solid <D>
R951	452530824	⚠	8.2 ohm, 1/2W, Metal
	Fuse		
F901	252166Y	⚠	6.3A-UL/T-237 <D/W>
F902	252076	⚠	3.15A-SE-EAK <P/W/Q>
F903	252075	⚠	2.5A-SE-EAK <P>
	Fuseholders		
F901A	25050065	⚠	YSH403T <D/W>
F902A	25050065	⚠	YSH403T <P/W/Q>
F903A	25050065	⚠	YSH403T <P>
	AC outlet		
P902	25050409	⚠	NSCT-4P234 <D>
	25050640	⚠	NSCT-4P451 <P/W>
	Switch		
S901	25065437	⚠	NSS-22157P <W>

REAR AMPLIFIER PC BOARD (NAAF-4703-1/1A)

CIRCUIT NO.	PART NO.		DESCRIPTION
	ICs		
Q571,Q572	22240108		μPC1225H
	Transistors		
Q562,Q563	2211732 or		2SC1845-F or
Q579,Q580	2211733		2SC1845-E
Q573,Q574	2213284		2SC1740S-R
Q575,Q576	2202063,	*	2SC4511-O,
	2202064 or	*	2SC4511-Y or
	2202066	*	2SC4511-P
Q577,Q578	2202053,	*	2SA1725-O,
	2202054 or	*	2SA1725-Y or
	2202056	*	2SA1725-P
	Coils		
L571,L572	231209S		S-0.4A
	Capacitors		
C563	354721019		100μF,6.3V,Elect.
C571,C572	354761009		10μF,35V,Elect.
C577,C578	354721019		100μF,6.3V,Elect.
C585,C586	374723334		0.033μF±5%,50V,Plastic
C587,C588	374724734		0.047μF±5%,50V,Plastic
C595,C596	354761009		10μF,35V,Elect.
	Resistors		
R585,R586	4000131Y		0.22 ohm×2,2W+2W,Metal plate
R587-R590	452530824		8.2 ohm,1/2W,Metal
R597	452530824		8.2 ohm,1/2W,Metal
	Plug		
P611A	25055234		NPLG-3P218
	Wire traps		
JL571	25050280		NSCT-3P108
JL572	25050282		NSCT-5P110

TONE CONTROL CIRCUIT PC BOARD (NAAF-4704-1)

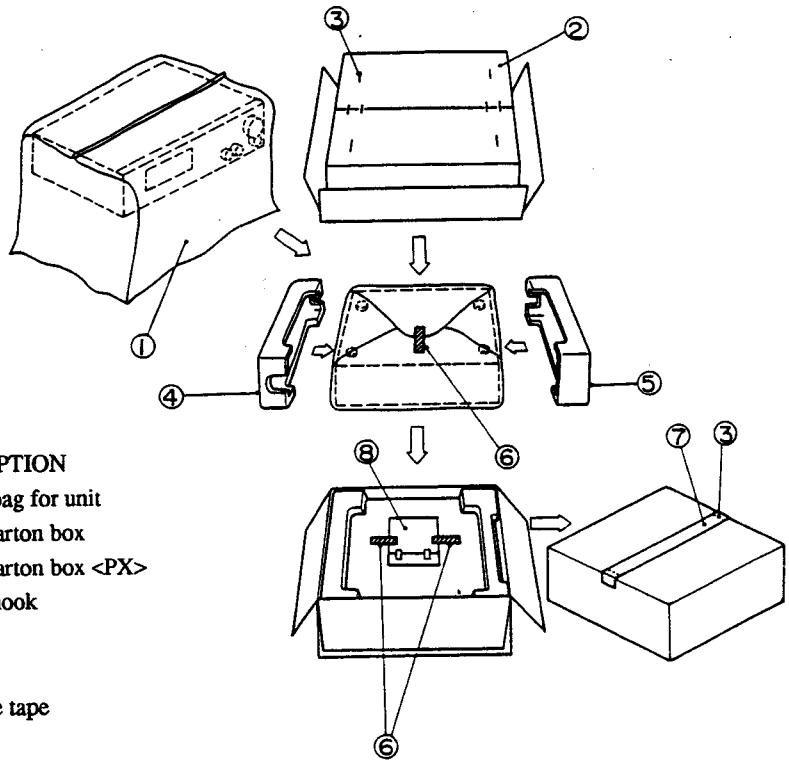
CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q401,Q402	22240247 or	BA15218N or
	22240293	NJM4558L-D
	Transistors	
Q403-Q406	2211945	2SK246-GR
	Diodes	
D401-D404	223205 or	1SS270A or
	223163	1SS133
	Capacitors	
C401,C402	354761009	10μF,35V,Elect.
C405,C406	354744709	47μF,16V,Elect.
C407,C408	374721534	0.015μF±5%,50V,Plastic
C411,C412	374721534	0.015μF±5%,50V,Plastic
C413-C416	374721044	0.1μF±5%,50V,Plastic
C417-C420	374721024	1000pF±5%,50V,Plastic
	Variable resistors	
R393	5104225	N11RGLC250KWT22Z,Balance
R407	5104230	N14RLC100KWT22Z,Bass
R413	5104230	N14RLC100KWT22Z,Treble

VIDEO CIRCUIT PC BOARD (NAETC-4705-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	IC	
Q251	22240373	BA7625
	Transistors	
Q252-Q254	2213354	2SA933S-R
	Diodes	
D251	22380046 or	AM01Z or
	22380035	GP104003E
	Capacitors	
C251,C253	354780229	2.2μF,50V,Elect.
C252,C254	354724719	470μF,6.3V,Elect.
C255	354780229	2.2μF,50V,Elect.
C258	354724719	470μF,6.3V,Elect.
C259	354721019	100μF,6.3V,Elect.
	Terminals	
P251	25045339	NPJ-4PDYE-190
P252	25045395	NPJ-2PDYE-221
	Wire trap	
JL251	25050529	NSCT-7P352

NOTE: <D>: 120V model Only
<P>: 230V/240V models Only
<W>: Worldwide model Only
<Q>: 240V model Only

PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29100034A	Styrene bag for unit
2	29052568Y	Master carton box
	29052574Y	Master carton box <PX>
3	282301	Sealing hook
4	29091615Y	Pad R
5	29091614Y	Pad L
6	261504	Adhesive tape
7	29110071	PP tape
8	Accessary bag ass'y	
	29341810Y	Instruction manual <D/PX>
	29341812Y	Instruction manual <P/W/C>
	29341845Y	Instruction manual <W>
	292111	FM antenna <D>
	292112	FM antenna <P/W>
	232140	NMA-3057,AM loop antenna
	2010200	Connection cord
	3010054	UM-3,Two batteries
	24140252Y	RC-252S,Remote control transmitter
	25065462	YAE21-0237,FM adaptor <W/F>
	25055018	CV-K-1,Conversion plug <W>
	25055251	CV-CP,Conversion plug <PX>
	29365019A	Warranty card <N>
	29365024A	Warranty card <F>
	29365021	Warranty card <PX>
	29358002J	Service station list <N>
	29100097	Styrene bag for accessary
	29100107	Styrene bag for warranty card <F>

NOTE: <D>:120V model only
<P>:230V/240V models only
<W>:Worldwide model only
<F>:French model only
<PX>:PX model only
<C>:Canadian model only

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